# PSYCHE

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## EDITORIAL

WE understand that it has been decided to attempt the organisation of an International Congress of Psychology to be held at Oxford towards the end of July, 1923. This project unquestionably deserves the support of all who are interested in the progress of Psychology in this country, for such Congresses, if suitably conducted, are likely to be of great value to the science.

Psychology, like many other subjects, has always suffered from the tendency on the part of its students to segregate special lines of enquiry into water-tight compartments, and a meeting of the leading workers in each department is calculated to do much to promote co-operation and to facilitate that free exchange of views which is the best road to mutual understanding.

It is greatly to be hoped that the responsible exponents of modern psychology among all nations will find it possible to attend the Congress, for it would be most unfortunate if the gathering were to fail, for any reason, to be thoroughly representative. In particular we venture to hope that it may be found possible to secure the presence of leading members of the German and Austrian schools, for though we do not necessarily agree with all the doctrines which they promulgate, there can be no doubt that in their absence any Congress must necessarily be incomplete.

One of the principal difficulties in organising a Congress of this kind is that of ensuring that a just proportion of the available time is devoted to each of the many topics which claim attention. The solution of this problem is certain to prove a far from easy matter, but none the less there are certain subjects which, in our opinion, should be given first-class priority.

Of these one of the most important is the suggestion that some kind of a central "clearing house" should be instituted, through which digests of all important publications should be "broad-casted" to those concerned. This would enable psychologists to keep in touch with contemporary work with comparative ease, and would obviate a great deal of the overlapping which is at present almost inevitable.

It has also been suggested that a Central Committee should be appointed to consider the problems of terminology. If any uniformity in this respect could really be achieved it would unquestionably be of the greatest possible benefit to Psychology, but we are strongly of opinion that any such procedure is hopeless until the fundamental problems of Symbolism have been thoroughly worked out. It will, therefore, be advantageous if some attention is devoted to this subject as a preliminary to the more concrete work.

Finally, we would urge the claims of including a comprehensive display of psychological, and especially psycho-physical, apparatus. Closer cooperation between physicists and psychologists is urgently needed in this field, and if, in addition to exhibiting existing apparatus, it were possible to invite a certain number of interested physicists to attend the Congress there is little doubt but that the perfecting of the weapons of experimental psychology would receive a notable impetus.

In any event, we hope that the efforts of those who have initiated the scheme will be attended by the fullest measure of success.

# "ENTIA PRAETER NECESSITATEM . . ."[1]

### BY W. WHATELY SMITH.

I am sure you will all agree that Psychology ought to be universally recognised as the most fundamental, if not actually the most important, of the Sciences.

Achievements in other fields, however remarkable in themselves, are really only of interest because of their effects on human beings: that is to say on account of certain states of mind for which they are responsible; and since states of mind are uniquely the province of the psychologist, it follows that the status and value of any other science must ultimately be assessed in psychological terms and judged by psychological criteria.

The object of this paper is not, however, to enlarge on this point, but rather to deal with certain causes which appear to be seriously retarding the advancement of Psychology to its proper position in the Hierarchy of the Sciences.

I wish to suggest that a comparison of Psychology with more generally recognised studies will show that it is very seriously deficient in certain qualities which appear to be indispensable to sound scientific progress in any field, and that a resolute effort to rectify these defects is an essential prerequisite to a general advance in knowledge and recognition.

The chief of these defects, and that with which I shall deal almost exclusively here, is in respect of the quality of simplicity, or, more strictly, in respect of the number of elementary conceptions to terms of which the phenomena, problems and theories of the science are in the last analysis reducible.

This may best be brought out, perhaps, by illustrations from other fields.

In Mathematical Physics, for example, the student is ultimately concerned with no more than the three fundamental conceptions of Length, Time and Mass, and to terms of these all the most intricate problems of the science are, intrinsically at least, capable of reduction. Chemistry, again, could not possibly be conducted satisfactorily if every substance could be referred to only by its geological or popular name. The development of the subject dates practically from the formulation of the Atomic Theory and from the recognition of a certain limited number of elements of which all complex substances are regarded as compounded. In general, as Professor Rougier well says, "every form of energy is the product of two factors, an intensity factor and a quantity factor, a variable of equilibrium and a variable of condition: . . . gravitational energy is the product of height and weight; volume energy of pressure and volume; electric energy of potential and charge or of electromotive force and quantity; heat energy of temperature and entropy."

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[1] A paper read to the Psychological Section of the British Association for the Advancement of Science, Hull, 1922.

In this respect Psychology offers a marked and depressing contrast to other sciences. Not only are we unable to point, as the Mathematical Physicist can do, to a very few technical terms and claim them as referring to our irreducible conceptions, but we cannot even go so far as the Chemist and plead that although at present we are compelled to recognise a relatively large number of distinct elements, they are at least rigidly and unambiguously defined.

Throughout our study of mental activity we are concerned with change or flux of some kind, but we have not yet adopted invariable terms for the general category of what changes, for that with respect to which the change takes place or for the nature of the units in terms of which the magnitude of changes might be expressed.

Nor can we even claim that we have effected any substantial reduction in the number of our irreducibles as the chemist does whenever he first analyses a substance into its constituents. On the contrary our vocabulary becomes ever more and more overcrowded, but the adoption of new terms does little to simplify our thought. Our favourite casual agent at the present time—the Complex—stands confessed by its very name as something far from elemental, and since new terms must themselves always be defined by the use of old ones their introduction can do nothing to make the meaning of the latter more precise.

We speak of Images, Ideas, Presentations and Thoughts; of Perception, Apperception, Sensation and Cognition; of the Field of Consciousness and the Focus of Attention; and we make statements which imply that certain relations of members of the first category to those of the last constitute the states referred to by those of the second. But we are far from universal agreement as to what difference, if any, is to be distinguished between Images and Ideas or between either of these and Presentations;

we are not prepared to say which of these terms refer to the more elementary conceptions or whether all are equally elementary; we have no universally accepted doctrine as to whether their relation to Consciousness is of a nature to admit of quantitative gradations, whether it is of an all-or-none type or whether it is not quantitative at all.

As we go further the position becomes worse. We talk freely of Emotion, of Affective Tone and even of "Affect," and we describe numerous more or less specific Emotions which, perhaps, we successfully correlate with certain instincts or types of situation. But it does not yet seem clear whether the change and flux of the presentational continuum is the cause or the effect of emotion, whether the latter is no more than a part of the former, whether one is epiphenomenal to the other, or whether each is a product of something transcendal to both. In fact we have not yet even decided whether or not it is possible to distinguish among the entities with which we deal, those which produce effects, those on which effects are produced and the effects themselves. Still less have we succeeded in allocating the entities to their appropriate categories.

The majority of the foregoing examples of the present confusion of our thought have been selected at random, but the last quoted case of emotion is one with which I have been particularly concerned in the course of my own work.

Some time ago I attempted to determine by quantitative methods how far the memory, or power of recall, of a word was influenced by the affective tone which accompanied the corresponding presentations in consciousness. I found that abnormally intense affective tone was liable to be associated with either of two diametrically opposite effects; the word concerned might be especially well remembered, or it might be especially quickly forgotten. The problem then arose as to whether these two contrary phenomena should be regarded as being due to something quite other than affective tone, or as due to two varieties of tone to which it would be legitimate to assign such distinguishing attributes as "pleasant" and "unpleasant," or whether it would be better to base the classification of affective tone on the experimental results themselves and to conclude that there exist two varieties of tone which may be defined solely in terms of their influence on the power of recall of the words which they accompany.

I need hardly say that, since I believe the whole business of the pure psychologist to consist in determining the nature and mode of operation of those casual agents which determine the content of consciousness, I selected the last of these alternatives and simply concluded that as a matter of experimental fact, two kinds of tone were demonstrated, of which one facilitated while the other impeded the accession to consciousness of the presentations which it accompanied.

I believe that this method of dealing with psychological phenomena is fundamentally correct, although the particular instance cited is, of course, a comparatively minor one.

At this stage I propose to make some attempt to indicate in a purely provisional and tentative fashion the kind of general lines on which I conceive that the procedure I have suggested might profitably be conducted.

First, then, as regards our irreducible conceptions I would suggest that there is at present no need for recognising more than two of these, namely, Consciousness and that which is or may be present thereto. These two conceptions seem to me to be truly elementary and irreducible, for although we are doubtless agreed that we all know what is referred to by the word Consciousness, I think we shall equally agree that it is not a thing which is capable of explanation: and similarly though we all know what is meant by hearing a sound or seeing a colour or feeling a pressure, and although we would admit that these experiences all involve the occupation of the field of Consciousness by distinguishable entities, yet we have no terms whereby we can further explain the nature of these entities whose presence in Consciousness constitutes experience.

We may therefore say, I think, that two at least of our irreducible conceptions are, first, Consciousness, and, second, a class of entities of which the distinguishing characteristic is that every member of the class is intrinsically capable of bearing a certain given relationship to Consciousness. To the members of this class I propose to refer generically by the term "Presentations," and I would hasten to point out that if I am using this word in a sense which appears too all-embracing or otherwise open to criticism, it is none the less a perfectly justifiable procedure provided it is quite clear that I am only using an arbitrary symbol, selected solely for the sake of convenience, to refer to a specifically defined class of entities: I might equally have referred to it as "the Class A" or by any other symbol.

We may also say with certainty that the relation which Presentations thus defined bears to Consciousness is one which may vary in degree. At any given moment the centre, so to speak, of our field of Consciousness is occupied by relatively few of the total number of Presentations of which we are to a greater or lesser extent aware. The ticking of our study clocks, the whiteness of the light reflected from the paper on which we write, the pressure of our clothes, the view from our window at which we may gaze in however great abstraction, are all represented by presentations forming a part of the content of Consciousness, as is easily realised when we reflect that however little we may be attending to them we should at once notice any considerable change therein. There are, moreover, many other presentations and groups thereof which are exceedingly remote from our fields of Consciousness at any moment and the quantitative nature of the relation which Presentations bear to Consciousness seems therefore unimpeachable although we must, of course, be most careful not to allow ourselves to be misled by any tacit assumption to the effect that this relation is identical with the spatial or temporal relations commonly dealt with in the physical world.

We may next inquire as to the status of those casual agents which are commonly supposed to be responsible for the degree of the Consciousness-Presentation relationship. At first sight it might appear that these should also be postulated as a distinct category of irreducibles *sui generis*, and it is possible that we shall eventually conclude that this view is right. At present, however, I am inclined to hold the opposite opinion, and to think that just as the concept of "force" is completely expressible in terms of mass, length and time, so the casual agents of psychic change may be defined in terms of more fundamental psychological conceptions.

At this point problems of real interest begin to emerge.

It will be generally conceded, I think, that Emotion or Affective Tone must be reckoned as being one of these casual agents, if, indeed, we recognise any at all, for otherwise we should be obliged to explain the known correlation of Affective Tone with the accession of Presentations to Consciousness by postulating some superior cause of an entirely unknown nature to which the variations in both classes of phenomena should be ascribed. The former is the simpler and therefore, provisionally at least, the better view.

But it must also be admitted that Affective Tone itself results from the presence of certain entities in the field of Consciousness, that is to say, the corresponding Consciousness-Presentation relationship is only a special case of the general relationship, and this is equally true whether we are content to locate the Presentations in question among one or more of the obvious subdivisions of the main class of Presentations or whether we elect to define a special sub-class *sui generis* for their reception.

The question then arises as to whether we are to regard this particular sub-class of Presentations as possessed of certain properties not predicable of all other sub-classes, that is to say, of the property of acting as casual agents with respect to the relation of the members of other sub-classes to Consciousness. If we adopt this view we are led into considerable difficulties, for to this privileged class must be ascribed attributes analogous to those of force, while the others must be supposed to be of such a nature as to allow of their being acted on by such forces. We should thus find ourselves driven into a kind of dualism which strongly suggests the distinction between "imponderable" forces and energy on the one hand, and "ponderable" matter on the other which raised so many pseudo-problems in physical science. These problems were never solved; they simply ceased to exist as soon as it was realised that the mass and inertia of matter are solely due to its internal energy, and that the whole gamut of physical change is better regarded as redistributions of energy only than as the interaction of energy and matter.

We should therefore be wise, I think, to profit by the lessons of history by refusing to commit ourselves too deeply to any rigid division of Presentational entities into those which act as casual agents and those upon which such agents act.

Moreover, if, as seems tolerably certain, the Presentations of which the access to Consciousness constitutes Affective Tone arise from the stimulation of certain receptors of the nervous system just as those whose access constitutes Sensation arise from the stimulation of certain other receptors, it seems difficult to see why the former variety should be so different intrinsically from the latter as to warrant our regarding them as a privileged sub-class endowed with casual properties which are not to be ascribed to other sub-classes.

But here again we can learn something from the recent developments of Mathematical Physics. So long as we do not profess to be talking in fundamental terms, it is quite permissible to say that one physical phenomenon is the cause of another, although, of course, all we actually observe is a certain succession of events in time. So long as we are dealing with events on this level, so to speak, we can legitimately and profitably distinguish force from matter and casual agents from the entities on which they act.

But as soon as we try to rise above mere approximations and to deal with fundamental realities, such phrases are no longer admissible. Forces and material bodies become merged in the single concept of energy redistributions, while even the sequence of events in time ceases to have any absolute significance, and is seen to be a purely fortuitous appearance dependent on the position of the observer relative to the system in question. For the order of succession of two events may be reversed for certain groups of observers if the distance between them in space exceeds the distance travelled by the effects by which they are perceived during the interval between their occurrences.

This at once makes cause and effect somewhat difficult to distinguish, and if we adopt a still more absolute view point the distinction seems bound to vanish altogether.

Just as we can determine the conformation for static equilibrium of any physical system from the condition that the potential energy shall be a minimum, so if we care to treat time as a fourth independent co-ordinate—as we are perfectly entitled to do—we can equally determine the equilibrium conformation for all four co-ordinates, thus representing a whole " sequence " of phenomena as one invariable configuration referred to four dimensional axes. It is clear that as soon as this is done the distinction between cause and effect is lost, for any observer independent of the system could only note certain distributions of energy.

Now even if it be contended that the entities of Psychology —Presentations and Consciousness to wit—are of a totally different order from those of Physics, it is none the less true that our views about Casuality are deduced in each case from the observation of the temporal succession of phenomena, and that Time is a co-ordinate common to both universes of discourse. It follows, therefore, that however different the phenomena of Physics and Psychology may be in other ways, they are amenable to identical treatment with respect to Time, and that the same arguments which demonstrate the purely relative existence of Causation in the Physical field are equally applicable to Psychology.

Consequently any division of Psychological entities into agents and " acta "—if I may so call them—is simply meaningless if we are trying to talk in absolute terms, although for ordinary purposes it may be convenient and is perfectly legitimate provided we realise that our resulting conclusions possess only a relative validity.

We see, then, that in Psychology, as in other sciences, we must constantly abolish distinctions and merge conceptions into one another as the level of our thought approximates more closely to the absolute view point, and that the more radical our treatment of any problem the smaller will be the number of irreducibles in which its solution is expressed.

I hope that the preceding passages may have succeeded in showing not only the necessity for a reduction in the number of irreducible psychological conceptions but also the kind of lines along which this reduction may be effected, and the kind of criteria by which the status of those conceptions which remain at any stage may be assessed.

But I also wish to make it quite clear that I have no wish to abolish completely the distinctions which we ordinarily make and the conceptions which we ordinarily use. These are, of course, valid only for an approximative level of thought, but the same applies to the conceptions which the practical chemist and physicist commonly use in the course of their work.

No one would wish the designer of aeroplanes, for example, to deal with all its problems by means of Einstein's universal intrinsic equations. It is quite true that the mass and weight of the aeroplane varies with its speed, with the temperature of its engine, and with other factors, but the designer can afford to neglect these effects as being infinitesimal in the context of his main problem for which the approximations of Newtonian mechanics are amply adequate.

Similarly the psycho-analyst, for example, is perfectly entitled to say that a complex is the cause of a repression, or that a dream is the symbolic fulfilment of a wish, provided always that we are quite clear as to the degree of approximation to absolute validity which such statements profess to attain.

The point which I wish to emphasise in this paper is the necessity of undertaking with the utmost rigour of thought a radical analysis of the fundamental conceptions of Psychology in order that we may always have absolute criteria available by which the order of the approximations we use may be assessed, and may thus guard ourselves against the creation of pseudo-problems and the difficulties which are bound to beset us if we allow ourselves to regard these approximations as possessing more than a relative validity. For unless we possess these absolute criteria we can never tell just where an approximation may begin to break down, as, for example, the Newtonian astronomy broke down in the matter of the peri-helion of Mercury.

Finally, I should like to urge, in this connection, the supreme importance of an adequate notation.

Those of you who are familiar with the usual course of psychological discussions will, I am confident, agree that the deficiencies of our terminology constitute the greatest bar to helpful controversy and concerted action. It is not too much to say that every single discussion I have been privileged to hear between psychologists, however eminent, has invariably degenerated into a series of questions of the type, "What do you mean by so-and-so?"

If this kind of thing be contrasted with similar discussions between chemists, physicists or mathematicians of equivalent calibre, the deplorable state of our notation is at once obvious. The mathematician can make his precise meaning clear by means of a few arbitrary but universally accepted marks on paper, and can express the most complex combinations in a couple of lines of writing. But, as I wish to urge most emphatically, the words that we psychologists use, the physical disturbances we create in the air while talking, are just as much a conventional and arbitrary system of signs as are the mathematician's symbols: the only difference sems to be that mathematicians are universally agreed on the significance—i.e., the "referents"—of their symbols, whereas we are not.

It is particularly instructive in this connection to review mathematical history, and to note the extraordinary degree to which advance has depended on notation. An obvious example may be found in the simplest processes of arithmetic. So long as the old and cumbrous Roman notation was in use, all computations were a matter of the utmost difficulty, and the greatest mathematicians were puzzled to find satisfactory general rules for the common process of division. The Arabic system changed all this, and was the first step towards facilitating computations of every kind. Logarithms, again, which have probably done more than anything else to ease the labours of the computor, are essentially a special form of notation by means of which a relatively simple principle is applied, and it is, indeed, not too much to say that it is notation alone which has rendered every important mathematical advance practicable.

I suggest, therefore, that it would be most valuable if, in addition to reducing to the lowest possible minimum the number of our irreducible concepts, we were also to adopt some rigid and invariable notation whereby we might deal with them. Something of the kind has, of course, already been done by Mr. Russell and Professor Whitehead in the borderland between mathematics and metaphysics, but I am not aware that the method has been at all vigorously applied to the peculiar problems of Psychology, although Dr. Moore and others have used the Rusellian notation to some extent in their work.

In conclusion, I need hardly point out, I hope, that the realisation of the ideals which I have here so briefly indicated will not be an easy task.

Much hard thinking and much ruthless censoring of cherished phrases will be necessary before we attain even to a level equivalent to that of contemporary physics. The suggestions which I have very tentatively put forward are doubtless doomed to be swamped in the rush of constructive thought which will some day, I am confident, sweep over this branch of our subject.

But I believe that radical analysis of the type I have outlined will, in the long run, prove infinitely more valuable to Psychology than any amount of the somewhat random experiment which from time to time threatens to engulf the science, and I venture, therefore, to urge that, despite the many and obvious difficulties, despite the somewhat arid and impersonal nature of the enquiry, a resolute attempt should be made to lay the foundations of an absolute science of Psychology upon which the more obviously practical applications may be based, and by which the validity of more everyday theories may be judged.

# THE SUBLIMINAL AND THE UNCONSCIOUS.

BY H. F. SALTMARSH.

THE time has long gone by when the arguments for the existence of the subliminal and the unconscious could be refuted by mere contemptuous denial. The evidence on which these theories are based is so well known, the facts are so well established, that there is no room for doubt that something corresponding to these conceptions actually exists; but when we turn to the question of interpretation and enquire into the nature of these two entities and the relations between them, then the way is open to considerable divergence of opinion. It is commonly assumed that they are both of a psychical nature, that they are either identical, are the one part of the other, or else that both of them are parts of some common psychical tract.

Before discussing whether this assumption will stand examination, it may be advantageous to consider briefly what is ordinarily meant by the word "psychical." The fact that it is usually, and perhaps implicitly always, used in contradistinction to the word "physical," tends to show that it is a word of privation, that is to say, that the attributes which it connotes are negative ones arising from the absence of their positives as they exist in the physical; in other words, what we mean by the psychical is that part of existence which is left over when the physical is deducted from the sum total of things.

Consider what is implied by the word "physical," viz., matter (i.e., something exhibiting the attributes of extension, quantity, inertia, and so on) or else indissolubly connected with matter (such as physical energy), and conforming with the laws governing matter, e.g., conservation of energy, etc., and as a corollary therefrom, complete determination.

On the other hand, what do we know of that which we call the psychical?

It is primarily non-extended, it possesses no inertia and is insusceptible to the kind of quantitative measurements which we apply to physical things. It is true that many psychologists hold the opinion that psychical states may be quantitatively measured, but in most cases they are those who have adopted the epiphenomenalist or some other form of materialist theory; in any case it must be remembered that the measurements of psychical states are those of intensity rather than of extensity.

Again, it cannot be denied that both psychical and physical agree in falling under the category of quality, but this is necessarily so, for the possession of qualities of some sort is the condition precedent of things being known to us. A thing which possesses no qualities whatsoever does not exist for us.

It is true that if we push the question back sufficiently far, we arrive at the point where matter itself, in so far as it is known to us, appears to depend on affectations of our consciousness, that is to say, we arrive at the Berkleyan metaphysic, but for the purposes of this argument it is not necesssary to go to that length. Psychical phenomena do not obey the laws of physical nature; Newton's laws of motion do not apply to the movement of thought, the principle of the conservation of energy cannot be shown to hold good of that which we may take to be the equivalent of energy in the psychical sphere, viz., conation, or, as it is variously called under its many forms, purpose, desire, will-power, determination, and so on. The conservation of the libido which is spoken of by the psycho-analysts is a matter which must shortly be discussed, but for the present may be set aside.

And finally, the great distinguishing feature of the psychical is its indetermination. I do not for a moment suggest that causation holds no sway among psychical phenomena, but its supremacy is not absolute. Bergson holds that the chief *raison d'être* of consciousness is to introduce indetermination into the determined order of the physical universe.

Unless we hold a mechanistic theory of mind, which is equivalent to resolving the psychical into the physical, we must allow some measure of indetermination.

As a corollary from this, the psychical may be described as the sphere of reason and morality as contrasted with the physical which is a-logical and a-moral.

If, then, we can accept the foregoing as being distinguishing marks of the two realms, let us apply them to the two conceptions under discussion, viz., Myers' subliminal and the Freudian unconscious. The subliminal is that tract of the mind which lies beyond the threshold of the normal consciousness; from it may spring the creative inspirations of genius, reasoned processes of thought, great, as well as trivial, ideas. It appears to cover the whole region of psychical evolution, there are tracts where ape-like and mischievous characteristics prevail, but there are also sometimes to be found signs of a higher development than that manifested by the normal personality. Besides the fantastic and lowly-evolved rudiments which persist therein, and which constitute a large portion of the contents of the dream, we may find evidence of a more acute logic, a deeper insight, a more divine creative faculty, and perhaps even a purer morality.

If indetermination exists in the normal consciousness, a fortiori, it exists in the subliminal, or at any rate in the higher regions thereof, if the supraliminal be not subject to the category of extension or exhibit the other properties of the physical, then neither does the subliminal. It bears all the marks of the psychical.

Turn now to the Freudian unconscious, and let us first see what the authorities have said about it. Dr. T. W. Mitchell, in his *Psychology of Medicine* (page 71) says: "It has no moral standard whatsoever, and is entirely lacking in all the qualities which we ascribe to our conscious logical thought. It is a-moral and a-logical." Dr. Ernest Jones, in his *Papers on Psycho Analysis* (chap. vi.) enumerates some of the characteristics of the unconscious. It is first of all repressed, secondly dynamic, thirdly related to primary instincts, fourth infantile, fifth illogical, and sixth predominately sexual. There are other characteristics besides those enumerated, such as timelessness, but the one chiefly insisted upon by all writers is that of determination. Jones says (*op. cit.*, page 19): "Freud attributes to psychical events a rigorous determinism," and it is a central tenet of the whole theory that the phenomena of the unconscious are governed solely by the pleasure-pain principle.

Now if we compare this list of characteristics with the criteria of the psychical, we shall find many points where there is a failure to coincide, in fact, taken on the whole, the unconscious presents many more of the features of the physical, more particularly that part of the physical which comes under the name psysiological. It is determined, a-moral, a-logical, dynamic and so on.

Let us take some of these points separately and in detail. The psychical is, as has been said, partly determined, but its very *raison d'être* is, according to Bergson, to introduce indetermination; to deny indetermination altogether is to reduce it to a function of the physical. If the mechanistic view be taken, the question of the relation between the subliminal and the unconscious is settled in advance, they are both manifestations of the same thing, and in essence are identical, not only with each other but also with the whole realm of physical existence; in fact, there is nothing but the physical and its epiphenomena.

Morality stands or falls with indeterminism, and the same may be said of logicality, for unless it be possible to reason in-correctly, logic and its rules lose their significance. If all our mental processes are completely determined and arise from the operation of inexorable laws acting on a previously determined state of things, our reasoning must be correct. What we call the laws of logic, if valid, are part of the system of law which governs phenomena, and as such cannot be avoided, if they are not valid, then nonconformity thereto does not constitute incorrect reasoning.

The next conception to be examined is the dynamic character of the unconscious, and here we must revert to a point already mentioned, viz., the conservation of energy of the libido.

Dr. Jones says (*op. cit.*, page 606): "Now, without maintaining that this is, strictly speaking, a form of energy, or that the laws relating to physical energy can be directly applied to it, one cannot avoid seeing certain resemblances between it and physical energy. . . . The principal of the conservation of energy, for instance, is certainly valid in the mental sphere to a far greater extent than has been supposed. . . . One feels, therefore, very inclined to venture the generalisation that the same principle of conservation and transformation holds in the mental as in the physical sphere." This view is held not only by the Freudians but also by Jung and his followers.

One might compare the unconscious to a vessel containing compressed air. There is a definite quantity of potential energy stored away in the compressed gas, and this seeks to find a means of escape. If exit be denied to it, the pressure causes strains in the material of which the vessel is composed, which strains typify the pathological symptoms arising in some of the neuroses due to repression, or else the pressure may cause a crack to develop in the walls of the container through which the energy may be dissipated, thus typifying neurotic perversities. The healthy method is to open a valve which will allow the compressed air to pass to an engine whereby the energy may be spent in performing useful work; this would typify sublimination.

The libido, then, is conceived as a pressure which, if its original means of escape is denied to it, will escape through any outlet it can find; some writers have likened it to Schopenhauer's "blind striving will," and this feature brings out clearly its incompatibility with the standards of psychicality (if I may coin that word). Psychical will is essentially directed; when I will a thing, I know what it is that I will; it is true that people are sometimes said to want something but not to know what it is they want, but this is due to the direction of the will fluctuating, or else it may be simply a vague uneasiness arising from physical causes.

The urge of the libido is much more analogous to the craving of the physical organism, in fact, as we have seen, it is related to primitive instincts, and is predominantly sexual. The phenomena of conversion hysteria show this dissimilarity with the psychical in an unmistakable manner, for here the repressed unconscious wish obtains its satisfaction by means of activities of a nature totally unlike that to which it was primarily directed. How unlike this is to the psychical processes may be seen by considering whether a conscious sexual wish would be in any way satisfied by the substitution for its fulfilment of another object, say paralysis of a limb.

The psychical is interested always in a "meaning," the unconscious appears entirely indifferent thereto.

Enough has been said to indicate the direction in which the view taken in this paper tends, and the point need be laboured no farther.

I conceive, then, the subliminal as being a psychical tract which stretches both beyond and behind the normal personality. It epitomizes the evolution of the psychical entity, and contains in itself the vanguard of progress in so far as it manifests characteristics of a more highly developed nature than is shown by the supraliminal, it also includes fragments and survivals of the past, monuments of an earlier epoch of evolution, remains of an infantile or even a pre-human period. At one end it touches the highest point reached in psychical or spiritual evolution, at the other the shadowy region of the past where the psychical emerges from the physiological.

The unconscious of Freud on the other hand certainly does not reach the evolutional level of the normal personality, if it is located anywhere in the psychical, it occupies that part of the subliminal which borders closest on to the physical, but in view of what we have seen above concerning its chief characteristics, it seems to me to be more in accordance with the facts to place it in the physiological altogether.

What Freud has done, then, is to dig down through the subliminal until he has reached the physical foundation which lies beneath it. The psycho-analytic theory has, as is well-known, evoked a storm of indignant criticism and abuse, and probably everyone, on being first introduced to it, has felt a certain amount of repugnance to some of its tenets. Now the reason for this seems obvious if the view taken in this paper of the nature of the unconscious be admitted. The Freudian "wish" is simply the urge of the physiological mechanism. So long as it remains purely mechanical it has no more unpleasant emotional effect on us than any other physical force, e.g., we have nothing but admiration for the various devices to secure pollination in the vegetable kingdom. But when it is translated into mental terms, then it becomes repugnant to our æsthetic, moral and logical senses; and it is this translation that Freud has made.

It is, of course, unavoidable that when the physiological impulses become known to us, they should clothe themselves in the garments of conscious desires, and, as so disguised, may be unacceptable. The psycho-analytic theory holds, however, that a great number of the repressed wishes have never emerged into consciousness, and the effect of the technique employed is artificially to bring about their emergence.

The infantile character of the unconscious appears to lend confirmation to this view. In the infant we approach nearest to the purely physiological, the psychical nature has not yet developed sufficiently to assume control and the infant is essentially more animal than human. It is only natural, therefore, that the impulses from the physiological when emerging into consciousness should show themselves in a form most like that part of the psychical which lies closest to their place of origin.

The technique of psycho-analysis may be cited as additional evidence. Free association seems to consist in the abrogation of control by the psychical, and the giving of a free rein to the physiological processes to lead where they will. They naturally display their nature and lead directly back to the place of their origin, hence it is that analysis always discovers infantile and sexual wishes. There is one more point to be considered, viz., the therapeutic value of psycho-analysis.

It can no longer be denied that neuroses have been cured by this means; we must therefore endeavour to see how such an effect can have been brought about.

One of the salient points of difference between the Freudian and the Zurich schools consists in the fact that the former stops short when the unconscious complex has been resolved, and its elements brought into consciousness, whereas Jung and his followers consider the cure incomplete unless some process of re-education is added. These latter psycho-therapeuts hold the opinion that, if the process is stopped short when the repressed wish has been uncovered and its nature disclosed to the patient, it is possible that further perverse conversions may occur, and a fresh neurosis arise unless the libido be directed into some healthy channel and the satisfactory sublimination thereby effected.

This view certainly appears reasonable. The neurosis arises owing to the discharge of the libido along its primordial channels being checked by the censor, satisfactory sublimination having failed, it escapes by way of the neurotic symptoms. What the analysis does is to render the patient aware of this unconscious process, and to let him see what is going on under the surface.

It is hard to see how this by itself would prevent the discharge of libido through undesirable channels, but it is obvious that the knowledge thus gained will assist the patient to effect satisfactory sublimination; Jung and his followers co-operate in this work with advice and suggestion!

Thus it appears that some sort of re-educative process is essential to complete cure under both methods, only Freud leaves it entirely to the patient.

Now whether psycho-analysis brings about a re-association of a previously dissociated psychical factor or, following the view taken here, discovers to the patient a physiological process gone astray, a conscious re-direction of the errant impulse is rendered possible.

And finally, there is one more point to be considered, viz., the position occupied by the Freudian censor.

Its function is to refuse admission to consciousness of those unconscious wishes which are unacceptable owing to their incompatibility with the moral and æsthetic standards of the conscious. To perform this function the censor must, on the one hand, know what those standards are, and, on the other, must be aware of the nature of the wishes. What, then, is its psychological position? It cannot be part of the conscious because of its awareness of the repressed wish which, *ex hypothesi*, remains unconscious, yet it would seem to share in the conscious because of its knowledge of the moral and æsthetic standards.

Is it an independent co-conscious entity, a *tertium quid*, which intervenes between the conscious and the unconscious?

We know that among the reflexes there are many physiological processes which, having been originally accompanied by consciousness, are now normally unconscious, or at any rate only subliminally conscious. I suggest, therefore, that these repressed wishes belong to the same category.

In the case of the reflexes, a saving of psychical energy is effected by their transference to the subliminal, and this, being of advantage of the organism, is secured by evolution; in the case of the repressed wishes, their manifestation being harmful, evolution has adopted the same plan and rendered them unconscious. Neuroses arise when, for some reason or other, these physiological impulses find vent in pathological symptoms.

# COMPENSATION IN NATURE.

### By H. Reinheimer.

"There is but one right, and the possibilities of wrong are infinite.—*Huxley*.

"I am well aware that scarcely a single point is discussed in this volume on which facts cannot be adduced, often apparently leading to conclusions directly opposite to those at which I have arrived."—*Darwin* ("*Origin*.")

IN a previous article it was concluded that in the course of evolution, life has made extensive use of Symbiosis, and that obedience to the principles involved, was indispensable to progress. These conclusions are here to be further corroborated.

Botanists tell us that insect-pollination is clearly associated with much of the evolution of the Angiosperms, the fruit-bearing plants; and, indeed, long before the advent of man, the insects had already turned the surface of the earth into a vast flower-garden, which supplied them from year to year with pollen or honey or other valuable substances. The Angiosperms, in their turn, aided, not only the evolution of the insects, but subsequently also that of the mammalia. The plant offers vital spare products to the animal, which, thus supported, prospers, and is able, in turn, to assist the perpetuation and the progress of vegetable species. Needless to say, the Symbiosis thus established, implied various limitations and restraints; but, on the whole, the advantages outweighed the disadvantages. One circumstance, not the least auspicious, was that the symbiotic relation most felicitously allowed the good of the whole to take precedence of that of individuals. Another, scarcely less important factor, was, that excess, so universally fatal to mortal life, was avoided. Nature is always consistent: *quod semper, quod ubique, quod ab omnibus*. The increase of viability and of status has always been on the side of widely availing, and, hence, widely sanctioned, usefulness, which is also the side of restraint.

Whether the plant consciously wishes to aid the animal, or not, is irrelevant to the argument. The fact is that the legitimate traffic between plant and animal, by allowing the good of the whole community of life to take precedence of that of individuals, has vindicated itself. Such traffic is the ideal alternative to predacity with its dire ill-effects. The socio-physiologically fair and righteous method of Symbiosis has proved its superiority over all others. Its results are supreme. And this being so, it emerges that specialisation according to mutual service and general avail towards life is the great desideratum of progressive evolution. Such specialisation involves an industrious, frugal, regular, life; whilst specialisation in predacity *per contra* involves an unrestrained, indiscriminate, irregular, unbalanced life, resulting in an abnormal metabolism and a tendency to general abnormality, to antitheses of all kinds, in short to suicidal evolution.

"Do unto others as you would others do unto you." That has been the Golden Rule of health and of progress from the very first. This truth is confirmed by palæontological evidence, which, rightly interpreted, shows that co-adaptation in Symbiosis represents the line of wisdom, whilst adaptation according to mere expediency represents the line of folly, it being only too true that *nunquam aliud natura aliud sapientia dicet.*

It may be asked how it is that Darwin, to whom we owe the "struggle for existence," was not able to anticipate the law of biological compensation, seeing that he was aware of some of its workings; as when, alluding to the establishment of mutually helpful relations between plant and animal, telling us: "Yet, if a little pollen were carried at first occasionally, and then habitually, by the pollen-devouring insects from flower to flower, and a cross thus effected, although nine-tenths of the pollen was destroyed, it might still be a gain to the plant to be thus robbed."

However, he failed to see that he was here dealing with a fundamental principle of co-evolution, obedience to which constituted the norm of life, whilst disobedience constituted the source of all evil. He wandered off instead into comparisons of the natural process with stock-yard methods and promulgated "Natural Selection"—a principle that is neither fish, flesh, nor fowl., i.e., it is neither physiological, nor sociological, nor physical, but a promiscuous mixture of many things. This unprincipled "principle" is supposed to have power to degrade the organism as readily as to uplift it, and to act generally according to the narrowest possible utilitarianism. I submit that such a principle could never have achieved progressive evolution. The strength of the fetish lay in the epithet, "natural," as an alternative to "miraculous." But the Selectionist deceives himself when he thinks that the sonorous phrase, "the operation of natural selection" stands for much more than "the operation of nature." It is alleged that nature is readily compliant with any and every form of degeneracy so long as there is a local profit to the organism.

If you point out that this is not very likely to be so, and that there is abundant evidence to show that Nature is mindful rather of the general good, you are met by the charge that you are illegitimately importing something into " evolution " which is certain not to be there, since the Selectionist cannot see it, as it does not square with his theory.

If the organism chose to abide in a good path, and is, hence, successful, we are asked to assume that it is " favoured "—we know not how. In cases of transitory success, we must believe, on Selectionist lines, that the organism has pleased Nature by the very expediency of its adaptation. So in old times men essayed to curry favour with the gods by short cuts—chiefly into the throats of beasts or of brethren, as in sacrifice. One should have thought that we had outlived such superstitions.

We are asked to " believe " that there is a power in Nature, which (with the aid of everything!) acts on all beings in much the same way in which the breeder acts on a few, which, were it true, would be a great misfortune, for it is increasingly seen that selection impoverishes the protoplasm. Man, after " selecting " with fatal results, can go to Nature to replenish (by crossing with wild stocks, for instance). But where in the world could Nature apply, to make good the inevitable damage done by " selection "?

Now the artificial diversification of organisms in domestication is plainly based upon qualification; and, if the natural diversification of life were at least shown to be based upon definite qualification, one would not repudiate, but, on the contrary, welcome, a theory of " the origin of species by natural diversification."

Unfortunately, the value of " Natural Selection " is precisely to shirk such qualitative issues and to act as a shield of ignorance. And it is because of this that one objects. I willingly believe that Nature, with the aid of life (variation) and of death (elimination) has produced evolution. But to my simple mind that is just the operation of Nature, no more and no less.

Meanwhile, " the operation of natural selection " has meant death to " compensation," which was consigned to the sphere of physiology, where it has ever since led a charmed life. Darwin refers to the principle of compensation as that of " balancement of growth," and, in the " Origin," he tells us that it has been propounded by the elder Geoffroy and Goethe at about the same time.

Goethe's version was thus: " In order to spend on one side, Nature is forced to economise on the other side," and Darwin comments: " I think it holds true to a certain extent with our domestic productions: if nourishment flows to one part or another in excess, it rarely flows, at least in excess, to another part; thus it is difficult to get a cow to give much milk and to fatten readily. The same varieties of the cabbage do not yield abundant and nutritious foliage and a copious supply of oil-bearing seeds. When the seeds in our fruits become atrophied, the fruit itself gains largely in size and quality. In our poultry, a large tuft of feathers on the head is usually accompanied by a diminished comb, and a large beard by diminished wattles. With species in a state of nature, it can hardly be maintained that the law is of universal application; but many good observers, more especially botanists, believe in its truth." Here, then, compensation appears merely as a casual phenomenon, occurring occasionally in the physiological economy of the body. But to save in one department as against special expenditure in another, is a fundamental necessity of organic life; and it is difficult to understand why Darwin should have denied to species in a state of nature such prudential arrangement, which is essential to " co-ordination " and co-operation.

An organ is like a semi-independent organism, and what it may spend depends upon the adequacy of the support, the compensation it in turn receives from others, attached or unattached. It may be in special co-operative relation with organs of a quite different organism, provided always there is fair compensation as between partner and partner. Some functions may thus, in Symbiosis, be transferred more specially to a partner, the respective organs becoming more emphatic in that partner, who, in turn, relinquishes some of his former functions, deputing them more specially to the other, who specialises and " hypertrophies " in respect of some other function.

The funds of life are limited, and this, and the dependence of expenditure on compensation, make it impossible that all, or many, parts could simultaneously receive excessive supplies. Some have to work, whilst others receive. Those in receipt of extra supplies are to use them for extra services to partners, be they organs or organisms, failing which the supplies will merely turn into impediments, threatening to lead the species into blind alleys of evolution. There is no *perpetuum mobile* of service to be had out of an organ or organism. Unilateral exploitation, such as is often practised in domestication, invariably leads to morbidity and degeneration. Such exploitation is avoided in progressive evolution, as in Symbiosis, where the mutual accommodation and the mutual specialisation are very precise, and where compensation, however inconspicuous on the surface of things, is the norm.

In the lichen, reproduction is increasingly deputed to the fungus, whilst the algal partner increasingly specialises in carbohydrate manufacture. The lichen may be said to be an example of integration by the method of compensation. The phenomenon, however, had not been studied in Darwin's day, and it has not been seen fit to modify his theory in accordance with the new knowledge gained, although hints have been thrown out, especially by botanists, that in Symbiosis we may some day detect the secret of evolution.

Relieved of some of its domestic burdens by symbiotic partners, the organism is enabled to make new exertions in other directions and to evolve accordingly. The various secretions and " swellings " of plants, which are of great nutritive and evolutionary value to us, and even their Vitamines, are provided by the plant in accordance with the principle of biological compensation. There need to be no nett loss to an organism as the result of the application of the " give and take " principle. Neither individuality nor status need to be deleteriously affected. If, in Nature, the principle of compensation operates more inconspicuously than in domestication, it works nevertheless effectively, and, very generally, more auspiciously. The productions of Nature are, in Darwin's words, " truer " and incomparably superior to the productions of man. The reason is that, normally, compensation is very precise in Nature, where unilateral exploitation—the enemy of individuality and of health—is avoided; whilst man, in his greed, over-exploits the organism and distorts Symbiosis. There is " Norm-Symbiosis " in Nature, which is in many ways superior to the compensatory relation between man and his domesticated " slaves."

The universality of compensation was, in a philosophic way, well apprehended by Emerson, according to whom: " An inevitable dualism bisects Nature, so that each thing is a half, and suggests another thing to make it whole: as, spirit, matter; man, woman; odd, even; subjective, objective; in, out; upper, under; motion, rest; yea, nay. The entire self of things gets represented in every particle. There is somewhat that resembles the ebb and flow of the sea, day and night, man and woman, in a single needle of the pine, in a kernel of corn, in each individual animal tribe. The reaction, so grand in the elements, is repeated within these small boundaries. For example, in the animal kingdom the physiologist has observed that no creatures are favourites, but a certain compensation balances every gift and every defect. A surplusage given to one part is paid out of a reduction from another part of the same creature. If the head and neck are enlarged, the trunk and extremities are cut short." Compensation, in other words, is fundamental. But it is only on a *tout-ensemble* view that the principle can receive its true setting. Unfortunately, the function of science is to isolate the parts and to treat them as though they had a separate existence of their own. Such method cannot but be in the long run inadequate and unsatisfactory. According to a mere specialist's view, for example, the final end of the whole flower, with all its parts, is the production of seed, and it is believed that the whole significance of the result is that the plant, merely self-regardingly wants to propagate its kind, *et preterea nihil.* This, certainly, is the present orthodox view.

But on a *tout-ensemble* view the case stands differently. It is co-evolution, and the wide bio-economic usefulness of the plant in biological compensation, which come into prominence, whilst the local profit recedes to the background. Let us take some concrete cases to show how this applies. In "Variation" Darwin unwittingly provides instances of biological compensation, which, on due interpretation, will be seen to go a long way in invalidating the doubts he had thrown in the "Origin" on the universality of compensation.

He mentions the cultivated gooseberry, telling us that the most successful cultivators in Ohio plant for every seven rows of "pistillata," or female plants, one row of hermaphrodites, which afford pollen for both kinds; but the hermaphrodites, owing to their expenditure in the production of pollen, bear less fruit than the female plants.

We may say that the female flowers excel in fruit-bearing, inasmuch as they are relieved, i.e., compensated, in other directions. Man, the conscious partner of the plant, obtains the coveted extra supply of fruit by assisting the plants on the score of care of progeny. He exploits, and partly aids, the natural principle of compensation and of Symbiosis. He provides suitable pollen by planting one row in eight with special pollen-carriers, which latter, not being specially called upon for fruiting, are able to excel in the production of pollen.

The universal truth is that where pronounced specialisation is required from an organism, the response may be obtained, provided the organism has had sufficient natural training in Symbiosis (is not predaceous or parasitic) and can rely upon adequate compensation. The combined greediness and ingenuity of man merely render more conspicuous what, in a milder and more beneficial form, has long been in Nature.

Again, Darwin stresses the fact that when the seeds or fruits of cultivated plants possess qualities disadvantageous to them as a means of distribution, we may feel almost sure that they no longer retain their aboriginal condition. The case stands thus: Under the exacting nature of man's demands, the plants, having largely modified their seeds and fruits to suit his wishes, have *per contra* to leave the care of distribution to his agency, thus becoming less proficient in some of their native qualities. New compensations have taken the place of old, and this change leaves its marks upon the physiology and anatomy of the plant. In how far the plant is duly compensated by the change remains to be seen in every case, it being one of the problems of agriculture and horticulture to determine how far the exploitation of the plant may be carried with the least detriment to the plant and to life generally.

What is true of care of progeny, also applies to the defence of the species. The cultivated lettuce is one of the plants that have ceased to defend themselves. In its wild stage, if we break a stalk or leaf, we see a white juice exude from it, the latex, a substance which vigorously defends the plant against the assaults of the slugs. On the other hand, in cultivated species, derived from the former, the latex is almost missing, and they fall a prey to slugs, unless protected by man.

Here, too, the exploited plant "expects" that man, its evolved and conscious partner, by way of compensation for services received, will perform the symbiotic duty of defending the species against enemies. The plant trusts in right as against mere might. It is long-suffering in reliance upon this principle, and in the end obtains its compensation and recognition:

"Methinks that there abides in thee
Some concord with humanity."

Darwin, it will be remembered, tells us that, contrary to his own view, some botanists believe in the universality of the law of compensation. The Rev. Prof. George Henslow, a well-known botanist, is one of their number. He thinks that everywhere there is a possibility of losses to be compensated by extra development in some new direction, with the result that creatures are capable of great variety of form and function, which would have been much restricted with other and more uniform structures, whilst it also thus enables a greater diversity of life to maintain itself under the every-varying conditions of environment.

According to him, compensation is a law or principle, which is found ranging over the vegetable kingdom as well as the animal. He instances weak stems, which often are compensated for by powers of climbing, "so that more plants can grow on the same limited area for the most part covered with trees and shrubs, as in the Brazilian forests." So in the vine the flowering branches offer their power of producing buds to become highly sensitive tendrils. In the *Compositæ*, many of the "florets," as in the cornflower, sacrifice their "essential organs" for the enlargement of their corollas, "probably in order to render them more attractive to insects," and so are better able to secure "inter-crossing of distinct flowers, in order to avoid too close inter-breeding."

"After all," Prof. Henslow concludes, "the law is but a general illustration of a great principle of Nature," which he calls "the continual effort of beings to arrive at mutual and beneficial adjustments—an adumbration of what I have called Symbiogenesis.

Darwin bowed too much to specialists with their narrow views, often, it is to be feared, at the cost of his own better judgment. I think it is due to this circumstance, more than any other, that he founded a theory with the leading idea that Nature is after the merely expedient profit rather than securing above all the well-being of the organic family as a whole. On narrow, utilitarian lines he thought he could understand a fact with which he was much struck when examining cirripedes, and of which many analogous instances could be given: "namely, that when a cirripede is parasitic within another cirripede and is thus protected, it loses more or less completely its own shell or carapace. This is the case with the male Ibla, and in a truly extraordinary manner with Proteolepas; for the carapace in all other cirripedes consists of the three highly-important anterior segments of the head enormously developed, and furnished with great nerves and muscles; but in the parasitic and protected Proteolepas, the whole anterior part of the head is reduced to a merest rudiment attached to the bases of the prehensile antennæ."

We have here a glaring example of the retributive losses universally suffered by predaceous and parasitic species. Yet Darwin sees in this very fact of loss a "profit"; for, if to a parasite a head becomes a useless structure, what does it profit him to waste nutriment in maintaining a useless structure?

It is astounding that such a view could have prevailed so long.

Here we have an obvious case of highly anti-social habits, directly causing the loss of a very important organ, the head, the only advantage to be set against such loss being that the organism, with less noble structure to maintain, can indulge the better in a debauched life—a nefarious, criminal life, injurious in effect and in tendency to the community of life, which is obliged, in sheer self-preservation to retaliate. And Darwin and his followers see nothing in it but a " decided advantage " to the species!

This is how Darwin continues: " Now the saving of a large and complex structure, when rendered superfluous, would be a decided advantage to each successive individual of the species; for in the struggle for existence, to which every animal is exposed, each would have a better chance of supporting itself, by less nutriment being wasted."

With argumentation of this kind, Darwin sees his way to order compensation out of court, and to install instead " Natural Selection ": " Thus, as I believe (!) natural selection will tend in the long run to reduce any part of the organisation, as soon as it becomes, through changed habits (!), superfluous, without by any means causing some other part to be largely developed in a corresponding degree. And, conversely, that natural selection may perfectly well succeed in largely developing an organ without requiring as a necessary compensation the reduction of some adjoining part."

All this, I submit, is illegitimate conjecture, or, at any rate, special pleading. It is not fair to disprove compensation by parasitism, which is an aberrant life, with compensation turned into retribution. And it is equally objectionable to try and disprove compensation in normal life, on the ground that there the " reduction "—the conspicuous and extreme atrophy—of adjoining parts incidental upon parasitism, is absent.

Forsooth, the parasite has no claim whatever, by way of compensation to a fine substitute for a degenerated head. There is here no absence of compensation, as Darwin imagines; but the very loss of structure is a compensation—to the rest of the community; whilst to the parasite there is negative compensation in the shape of retribution.

Moreover, there is compensation even from a mere morphological point of view; for it is well known that reduction of organisation in parasites is invariably attended by over-development of the stomach and the sexual organs, which, often enough, are all that is left—a reversion to nullity. A female crustacean, for instance, through the deforming influence of the parasitic life, may end by becoming little more than a sack full of eggs.

It surely does not need an imaginary entity, such as " Natural Selection " to incapacitate a parasite from obtaining a fine substitute for a lost head. The absence of merit, of qualification, and, hence, of " funds," is enough to render real gains futile. The parasite's case is socio-physiologically perverse. The parasite has forfeited support. Its case has long become pathological. This is the common sense, and also the science of the matter. And, if Darwin "believed" that, conversely, "Natural Selection" may sometimes succeed in largely developing a structure, we might equally "believe" that it is merely "Nature" who performs the feat, with the addendum, however, that she has previously been furnished the necessary funds by the work of the species, which work, if it is honest and biologically valuable enough, precisely purchases new acquisitions at the cost of joined work, but not at the cost of adjoining parts. Parasite and honest organism are on two altogether different paths of life, and unless we draw these distinctions, we are in danger of comparing things that are quite disparate, and mixing up things promiscuously.

Only a mind trained in "Natural Selection" would expect to find a parasite specially adorned with noble structure. Ordinary intelligence would rather expect it to be a case of Nature adopting the attitude of: "I will get it from his purse or get it (compensation) from his skin." The parasite pays out of its skin—its purse being empty. The honest organism pays out of its purse, i.e., by services, with no need of atrophy of noble structure. Compensation, therefore, must be understood socio-physiologically, just as "habits" must. And Darwin practically admits in the above passage the paramount importance of habits—his "Natural Selection" is merely stumbling behind habits. Habits with their correlations and reactions are enough to account for the greater part of evolution, and there seems no need whatever to interpose a "Natural Selection" at all.

On the same page of the "Origin" in which Darwin dismisses compensation, he "presumes" that lowness of organisation means "that the several parts of the organisation have been but little specialised for particular functions."

Even on this test we should have to assume a decided and serious loss of status in parasitism, where function is increasingly confined to self-regarding feeding and multiplication, where noble specialisation is basely sacrificed for an ignoble existence. And from this assumption it should not be a far step to the recognition, which is all-essential (though it constitutes a disavowal of "Natural Selection," of "evolution by mere adaptation") namely, that parasites are "failing" species, that the principle of parasitism is the very denial of progressive evolution. Had Darwin probed this matter of status more profoundly, this might have convinced him that parasitism shows precisely how progressive evolution could *not* have been achieved, and that, hence, some opposite principle must be looked for. He fully admits that in parasitism important instincts and structures are being lost, and sometimes he even concedes the felonious character of parasitic habits. Unfortunately, however, an alternative, integrative principle was not at hand; and so Darwin had to be content with a dialectically contrived dual principle—combining destruction with preservation all in one—a veritable Achilles of destruction, with a vulnerable heel, namely, a weakness for local profit, out of which weakness there arose sufficient eliminated " preservation " to originate species. The proof of the alleged principle lay in the fact that the species were " adapted."

Adaptation, preservation, destruction, competition, survival, profit, evolution, nature—all these are great facts; but I fail to see that any of them prove " Natural Selection."

On his assumption that adaptation according to mere local profit is the maximum of righteousness to be expected from a " self-acting mechanical " process, Darwin as readily condones parasitism as he dismisses compensation. Why should not, according to him, " Natural Selection " occasionally make parasitic habits permanent, " if of advantage to the species, *and if the insect whose nest and stored food are feloniously appropriated, be not thus exterminated* " (italics mine).

" I can see no difficulty," is Darwin's favourable phrase in cases of this kind. The organism having somehow formed an overpowering habit in a particular direction, " Natural Selection " hastens to the aid of the conquering habit. It is all very human. And that many biologists find Darwin's the best " working hypothesis," is, after all, also human. The human factor, it seems, is as irrepressible in modern science as in Greek mythology. As a theological critic says: " A theory may well be embraced by men of science without its being a scientific doctrine, or one established by scientific arguments; only too many such theories enjoy currency in scientific circles to-day."

Another distinctly human trait is that even " Natural Selection," the self-acting, has " her " scruples, as the above passage shows. Being more far-sighted than the organism itself, which is often far too much the slave to habit, " she " at any rate would fain stop short at exterminating the " host "—the goose that laid the golden eggs. It is well that there is a modicum of sense of propriety left in this world ruled by " adaptation." A little " felony " is pleasing to Nature, and even curries "favour" with her. "Too much," however is to be avoided, since it comes too obviously near defeating the organism's own ends, and frustrating even those of "Natural Selection" herself. For "she" does not relish ranging herself on the side of defeat. Is "she" not the Goddess of "Survival"? As an eleventh hour repentance on the part of this miraculous agent, we get a little forbearance with the supplier—when he is all but bled white by merciless "profiteering."

To concede a higher or more extensive goodness than this, would not be compatible with the rôle of a "self-acting" process. It would constitute it a moral process, a contingency with which Darwin was not prepared to reckon. But Nature is far too consistent with herself to sanction even partial felony, and Emerson had a fine intuition when he declared: "Every faculty which is a receiver of pleasure has an equal penalty put on its abuse. It is to answer for its moderation with its life. . ." "If the gatherer gathers too much, Nature takes out of the man what she puts into his chest; swells the estate, but kills the owner. Nature hates monopolies and exceptions." In other words, it is the whole method of predacity which Nature, ever careful of compensation, objects to. Had not the study of the early phases of disease, and, concurrently, that of evolutional pathology, been grievously neglected, this truth would long ago have been realised. In my litle book on "Evolution by Co-operation" I have dismissed "evolution by parasitism" as an utter impossibility.

As a pioneer and an observer, Darwin ranks very high; and, to this day, his works are veritable goldmines of information, much of which he had quarried for us from primal sources. So far from wishing to minimise his merit, I have no hesitation in acknowledging Darwin as the greatest biologist that has ever lived. Yet he may be said in his own case to have typified compensation inasmuch as his extraordinary devotion to biology left him somewhat weak on the side of philosophy.

His practical denial of the eternal difference between right and wrong, I believe to have been a great bar to progress. I am in agreement with those who hold that Darwin's theory of Natural Selection unavoidably connived at much that is evil in our civilisation.

The nineteenth century, according to Mr. Benjamin Kidd, presents in its two halves a curious conflict. Whereas in the first humanitarianism was the dominant note, a sudden and violent change came about 1860, with the presentation of Darwin's thesis. It was not science which created the universal fame of the Darwinian conception. It was rather the half-informed pagan mind of our civilisation. "For centuries the Western pagan had struggled with the ideals of a religion of renunciation and subordination coming from the past. For centuries he had stiffly bowed his armoured back to them, but mostly without inward comprehension. But here was a conception of life which stirred to its depths the inheritance in him from past epochs. This was the world which the master of force comprehended."

Current thought, politics and trade—all were affected. The rule of "look after number one" was again sanctioned: "There is no precedent in the history of the human mind to compare with the saturnalia of the Western intellect which followed the publication of this (Darwin's) book."

Unfortunately, Darwin felt, as Kropotkin says, a sort of paternal predilection for his hypothesis of Natural Selection, and he was apt to unduly minimise other factors, the due establishment of which might have detracted from the "glory" of Natural Selection. We have seen how this applies in the case of compensation, and it is equally true in that of co-operation, which is taboo to some of Darwin's "disciples."

Seeing that co-operation, as a moral factor, is irreconcilable with Natural Selection, these would fain deny it altogether. A leading exponent once wrote me to say that he sees no gain in clearness in my speaking of co-operation, and that to speak of it rather obscures the problem. He would merely acknowledge a *modus vivendi*, as he said, by which he probably means the aforesaid eleventh-hour repentance of "destruction-preservation" (Natural Selection) in stopping short at exterminating all "prey."

As Kropotkin points out: "There is not the slightest doubt that the hesitation of many biologists to recognise sociability and mutual aid as a fundamental feature of animal life is due to the contradiction they see between such a recognition and the hard Malthusian struggle for life which they consider as the very foundation of Darwin's theory of evolution." Such a postulated struggle, as Kropotkin shows, is more often than not avoided by social animals. But far more fundamental and much more important even than the sociability amongst animal species, is the essential co-operation, or life-partnership, between organisms of different species—more particularly between plant and animal—namely, Symbiosis; and in view of the facts of Symbiosis, the repudiation of co-operation at the present day is quite inexcusable.

It is clear from the foregoing that it is chiefly round moral factors that issue will once again have to be joined. The issue is, in fact, much the same as that which prompted Emerson to compose his essay on compensation. To Emerson, "compensation" was somewhat of a "*rève de jeunesse.*" The documents from which his doctrine was to be drawn, charmed his fancy by their endless variety, and, he says, they lay always before him, even in sleep. "It seemed to me that in it might be shown men a ray of divinity, the present reaction of the soul of this world, clean from all vestige of tradition. . ." "It appeared, moreover, that if this doctrine could be stated in terms with any resemblance to those bright intuitions in which this truth is sometimes revealed to us, it would be a star in many dark hours and crooked passages in our journey that would not suffer us to lose our way."

Popular theology, according to him, had lost its way, and he enters a demurrer to the base tone in popular religious works of the day "and the same doctrines assumed by the literary men when occasionally they treat the related topics."

Emerson thought that popular theology had gained in decorum, but not in principle, over the superstitions which it had displaced. But, according to him: "Men are better than this theology. Their daily life gives it the lie. Every ingenious and aspiring soul leaves the doctrine behind him in his own experience; and all men feel sometimes the falsehood which they cannot demonstrate. For men are wiser than they know."

What is the falsehood against which Emerson more particularly inveighs? "The immense concession that the bad are successful; that justice is not done now."

The blindness of the preacher consisted in "deferring to the base estimate of the market of what constitutes a manly success, instead of confronting and convicting the world from the truth; announcing the presence of the soul; the omnipotence of the will; and so establishing a standard of good and ill, of success and falsehood." Here, then, we are on a parallel, if not the identical, path with Emerson. We have seen that in this important matter of establishing a standard of good and ill, of success and failure, as in that of demonstrating the universality of compensation, modern biologists have failed even more ignominiously than did the popular theology of Emerson's day. Instead of being shown that an organism can only reap what it has sown, that in the organic world, too, "as righteousness tendeth to life: so he that pursueth evil pursueth it to its own death" (although, for a time, "the wicked doth compass about the righteous "), we get Darwin's denial of compensation, his virtual glorification of parasitism, and, to crown all, Huxley's proclamation of the thesis that the world is as a gladiator's show, even in the past history of mankind the essence of the struggle for existence having been constituted by self-assertion, by unscrupulous seizing of all that can be kept; in short by those qualities, which man shares with the " ape and the tiger ," that the " practice of that which is ethically best—what we call goodness or virtue—involves a course of conduct which, in *all respects*, is opposed to that which leads to success in the cosmic struggle for existence." Modern biologists still stand too much in awe of Huxley to have travelled far away from his position, although in some quarters at least it is being realised that he has gone too far. The " Times " (7.1.15) found Huxley guilty of proneness to overstate his points, the writer insisting that " to lay the foundation of a new morality upon the ' improvement of natural knowledge ' was to rest his foundation upon one stone where several were needed."

Another writer in the " Times " (Lit. Sup. 14.2.18) insists that democracy will never have the same affinity for science as it has for literature, and he says: " The inevitable antagonism between science and democracy is one of the unsolved problems and serious dangers of the future; and it can never be wholly solved by a better provision for science in education because the opposition is in the nature of the two things."

He retorts to Prof. Bateson's attempted vindication of science thus: " He shows some of that arrogance and lack of balance which generally, though in his case quite falsely, suggests the lack of training in humane letters—' science is the one permanent and indispensable light in which every action and every policy must be judged '—and he shows the usual irritation at the fact in which he expects no change, that the leaders of public opinion are nearly always men whose education has been more literary than scientific."

Yet, intrinsically, I venture to think, the case of science does not stand so unfavourably as it is here depicted. The present dissatisfaction with, or inadequacy of, science is largely due to bad interpretation. A saner interpretation, I believe, would be capable of providing educational disciplines the equals of literary.

This is how Emerson points the way to a more complete comprehension of compensation.

" The universe is represented in every one of its particles. Everything in Nature contains all the powers of Nature. Everything is made of a hidden stuff; as the naturalist sees a type under all metamorphoses, and regards a horse as a running man, a fish as a swimming man, a bird as a flying man, a tree as a rooted man. Each new form repeats not only the main character of the type, but part for part all the details, all the aims, furtherances, hindrances, energies, and whole system of every other. Every occupation, trade, art, transaction, is a compend of the world and a correlative of every other. Each one is an entire emblem of human life; of its good and ill, its trials, its enemies, its course and its end. And each one must somehow accommodate the whole man, and recite his destiny."

This well shows how natural science can be broadened and made contributive to common sense, and, as such, become a valuable asset in the training of future generations. Some such *tout-ensemble* view is indeed needed if "evolution" is to be lifted out of its present rut, if it is again to become a source of inspiration. Biology must be "humanised" if it is to be a potent force in education and in life, and this can now be fully accomplished without any detriment to it as a science. No due allowance has hitherto been made for the factor of frailty of life, which is universally responsible for disease, for penalisation, for retribution, for nemesis and extinction. Here we have a psychical, and, at the same time, a socio-physiological and moral, factor, that has hitherto been almost completely neglected. Once due allowance is made for this factor, we arrive at a view of evolution which differs *toto coelo* from the mechanical one in which men of science have hitherto placed their reliance.

On these matters Emerson may be said to be ahead even of our own time. Endowed with gifts of genuine insight, he has a fine appreciation of the value of psychological and moral forces. He is alive to the fact that the temptation to selfishness, to abuse of power, and to short cuts, is ever present, and that, hence, there arise various forms of opposition to the ends of nature. He realises, in a general sort of way, the evils due to predacity, and he is too firm a believer in the psychical uniformity of all living things to consider that *homo sapiens* is alone concerned in the respective sequences of cause and effect. Emerson's intuition, indeed, fairly correctly visualised the logic of Nature in these matters, and that the homage he paid to compensation was by no means exaggerated, is now easier to demonstrate on scientific lines than ever before.

The following of his remarks might well be incorporated in a chapter of evolutionary pathology—of which "evolution" may be said to stand in great need:

"The ingenuity of man has always been dedicated to the solution of a problem—how to detach the sensual sweet, the sensual strength, the sensual bright, etc., from the moral sweet, the moral deep, the moral fair; that is, again, to contrive to cut clean off this upper surface so thin as to leave it bottomless; to get a *one end*, without an *other end*. The soul says, Eat; the body would feast. The soul says: The man and woman shall be one flesh and soul; the body would join the flesh only. The soul says: Have dominion over all things to the end of virtue; the body would have the power over things to its own ends. The soul strives amain to live and work through all things. It would be the only fact. All things shall be added unto it—power, pleasure, knowledge, beauty."

But compensation is too eternally justified, and: "We can no more halve things and get the sensual good, by itself, than we can get an inside that shall have no outside, or a light without a shadow. . ." "Our action is overmastered and characterised above our will by the law of Nature. We aim at a petty end quite aside from the public good, but our act arranges itself by irresistible magnetism in a line with the poles of the world."

Inasmuch as orthodox biology has not yet made similar recognitions, we may indeed believe that there must be an unavoidable antagonism between science and democracy. But, since, fortunately, the basic righteousness of nature can to-day be abundantly demonstrated by the means at the disposal of the biologist, this will before long bring biology, as truly integrated knowledge, more into line with democracy than it has hitherto been.

# INDUSTRIAL PSYCHOLOGY IN GERMANY.

BY HUGH QUIGLEY.

THE question of psychology in industry has been a favourite theme of discussion during recent years, especially in the form it has taken with American advocates of sub-division of labour to the absolute minimum. A sordid aspect has been given to the whole question merely through this desire to reduce labour to automatic exercise of certain muscles without the direct interest of intelligence. The Taylor and Gilbreth systems, although, from some points of view they have a definite sphere of usefulness, especially in the elimination of unnecessary methods of approach and arrangement, reach very soon a limit beyond which their economic value becomes more apparent than real. The unit of labour is reduced to the mere action of certain muscles corresponding instinctively to certain motions required in carrying out the operation in question, but the reduction to automatic production is never quite complete, and any break in the process, voluntary or involuntary, leads to progressive depreciation of actual output of labour ending in complete incapacity in many cases. The highly complicated nature of modern machinery, especially electrical, has rendered automatic production rather less important than intelligent adaptation, and increase in interest with its accompanying intellectual awakening means, as a rule, finer and more beautiful work. The constructive instinct is deliberately stultified and repressed by the American methods, with the result that no demands can be made on the powers of the workmen when new machinery is installed or a modification in the operation becomes necessary, while the essential factor in any industry, the pride of the workman in his own work, disappears behind more material interests, the question of wages especially, and the satisfaction of instincts repressed in automatic work. In the latter can be seen the fundamental cause of unrest among workmen in industries where sub-division of labour has been brought to a logical conclusion; work possesses no interest for them when the constructive instinct becomes neutralised and something more exciting tends to take its place. The genuine workman remains an artist, at heart, even if the conventional label cannot be tacked on to him; he feels, consciously or unconsciously, that a vital part of his life can be ennobled or degraded in proportion as his conception of work is raised or lowered, and that, in many essentials, the real force and splendour of existence lies in the knowledge of something well done. Marble or paint is not necessary to him; the co-ordination of intelligence and muscle in some act of labour means the beginning of art, however elementary it might be in the eyes of connoisseurs, and the finished product bears the mark of this artistic instinct. The American systems ignore this factor almost entirely, and their main defect must lie in this rather more than in anything else.

A further development of psychology has taken place in industry in Germany, slightly different from that practised in America, and more theoretical in tendency. The actual progress of labour is not regulated on a scientifically exact basis of movement and production, but the mentality and psychological peculiarities of the workman are tested before he is placed in the branch of labour most suited to his capabilities. In this preliminary examination of the workman the aim followed remains purely materialistic, but not so blatantly materialistic as that of American psychologists. Experimental psychology changes over from the registration of mental associations and changes at certain impulses and movements to the comparison of those associations and changes as they occur in industry. From being a somewhat abstract science, weakened by the contradiction between method and subject, it becomes a definite part of industrial development, used in industry as an instrument for testing efficiency. It is no longer scientific in inception, and its results are limited to certain industrial requirements. This adaptation of experimental psychology to industry has been associated with the names of Dr. Piorkowski and Dr. Moede, and their journal, *Praktische Psychologie*, the model of our *Journal of Industrial Psychology*, contains practically all that has been published of importance on the subject in Germany. Examination of the methods carried out by Piorkowski and Moede will form the subject of investigation later. The main point to be noticed in this recent development of experimental psychology in industry is that no effort is made, as in America, to reduce every operation in manufacture to automatic movement, but rather that emphasis is laid on fitting the workman into his proper position in the work where his strongest faculty or faculties will have full play. In this sense the German theory means an advance on the American.

The uncompromising attack of idealists like Heinrich Rickert and Georg Simmel on the whole theory behind psychology in all its aspects, and their refusal of the name of science to a movement which is neither purely mathematical nor purely philosophical, but adopts the methods of the one and the logic of the other, have caused a reaction against industrial psychology of any designation. Psychology becomes for those idealists a minor form of sociology, and the real value of any study which is based on or includes psychology must lie in its sociological content, not man alone but man in relation to other men, to those forms social communion takes in industry, trade, exchange, religion, art, history. This aspect of psychology need not interest us here since it is largely a question of sociology and not of industry; it proves, however, that a large body of the most scientific and most philosophical thinkers of Germany remains hostile to any innovation based on the Taylor and Gilbreth systems, and that industrial psychology in Germany must keep within more humane and more ideal limits than in America. This limitation must be considered in itself a good thing since the progressive strength of industrial psychology disappears when the object of investigation becomes mechanical and materialistic, and only comes again into expansion when a higher development acts as a source and method of inspiration. It is possible to combine the constructive and artistic instinct with greater efficiency and accuracy of production, and it should be the purpose of experimental psychology when applied to industry, not to supply an enthusiastic statistician with rows of figures, or the capitalist bent on dividends with a regular supply of high power muscles, but to bring the essential characteristics which denote a workman into direct connection with those sections of work where those characteristics have a strong creative impulse and some immediate expression. Psychology should approach industry through the constructive instinct, and by means of this instinct cause, almost unconsciously, complete efficiency, and a high rate of production. Both efficiency and production remain essentially problems of psychology, and not of automatic muscular adjustment, and, in the solution of those problems, psychology must find its unique justification.

Industrial psychology on an experimental basis has been very recent in Germany, the earliest laboratories dating from 1919, and any results obtained have still a somewhat preliminary value, suggestive but not entirely conclusive. Any claims put forward by enthusiastic advocates of the new science (or rather branch of industry) must be examined very carefully before being accepted in full credence. Such a movement can only overcome initial difficulties in a decade, since the value of selection from the beginning to the end of apprenticeship with any workman becomes evident several years after he has become fully qualified. In this sense the statistics prepared by psychological experts to show the economy effected in the provision and training of labour, however true they may be at the moment, cannot be considered infallible, since human psychology is never uniform nor uniformly progressive in any sphere of education, and a single lapse may suffice to disprove all the conclusions triumphantly affirmed by statisticians.

Differentiation must be made between special psycho-industrial institutions, the universities and technical high schools, and individual firms. Progress has been most marked among the last named, although the courses provided by the Technical School at Berlin-Charlottenburg have acted as a basis for adaptation and development. As early as 1918, testing of apprentices on a psychological basis was carried on by the Carl Zeiss Company, in Jena, and after 1919 the Moede system has been adopted on a much larger scale—to examinations covering hundreds of applicants. Next in order of time come the Osram Works with a special department established in 1919 with Dr. Piorkowski as director, to undertake the classification of poor workmen and test women by means of special apparatus, Ludwig Loewe and Company, the Auerlicht Gessellschaft, Elektrotechnische Fabrik Rheydt, Max Schorch and Co., and the Dortmunder Union. In 1920 development spread to the leading German industrial organisations, to Krupp, the A.E.G., Siemens and Halske (where a psycho-industrial laboratory was built for examination of women employed in electrical engineering), Blohen und Voss, the Maschinenfabrik Augsburg-Nurnberg, the German Post Office, and the State Railway centres at Berlin and Cassel. In 1921 progress was slower owing probably to the greater interest taken by the Universities and Technical High Schools in the subject, and it has since become a regular practice for firms to send workmen and prospective apprentices to these institutions for examination. Development along those lines will probably be a characteristic of the future, and it is to these technical institutions that future experiment and probable expansion will be due. Chief among them stand the Berlin-Charlottenburg Technical High School, the University of Berlin with its " Psychotechnisches Institut," the High School of Commerce with its " Institut fur Wirtschaftspsychologie," similar in educational practice to the department of " Industrial Psychology" controlled by Dr. Geise in the University of Halle. Other universities interested are Gottingen and Dresden, while the leading technical institutions, at Darmstadt, Mannheim, Cothen and Hanover especially, have already instituted special courses, and are in process of founding psychological test laboratories. The industrial value of this movement has also appeared sufficient to justify the establishment of private organisations of a purely commercial nature where the actual labour of testing apprentice-applicants and workmen is undertaken in return for a definite fee per applicant. Most interesting of those organisations are the "Orga-Institut fur Arbeitswissenschaft und Psychotechnik," directed by Dr. Piorkowski, in Berlin, and the "Institut fur praktische Psychologie," founded by Dr. Moll.

It is difficult to define in the short space of one essay the many fields of activity covered by the subject, and attention must be devoted only to its main aspects. Experimental psychological methods have been used especially with female workers in the electrical industry, with apprentices entering a trade, and, in some cases, with fully trained workmen. Their aim is not examination of highest capacity or ability, not the production of abnormally skilled or intelligent workers as a standard for criticism and evaluation of others, but rather discovery of the normal or mean between the highest and lowest. The strong elements in the character and physique of an individual are registered as exactly as possible in reference to the weak, so that his real position in the workshop can be found. The exigencies of modern mass production have caused greater emphasis to be laid on precision of the senses, attention and skill in action, and closer co-ordination of intelligence and physical movement. The psycho-industrial laboratory aims at discovering the special qualifications of apprentices to meet this intensive development in technical ability. Reality is imitated as closely as possible in the methods of registration. Instruments, approximating to workshop instruments, are used. A further development lies in direct association of this movement or series of movements with conditions actually prevailing in the workshop—the capacity to carry on work in a multiplicity of noises or to do more than one thing at the same time—while the final stage is reached when pure laboratory testing is adopted without reference to workshop conditions, and in accordance with pure theory in the use of statistics. The tests themselves cover time-tests where the unit of record is the period covered by some movement or reaction to stimuli, instruction tests where the intellectual capacity to understand technical lectures, drawings, essays forms the subject of examination and functional tests where the senses are brought into play. All three tests cover everything desirable in an apprentice, attention, will, thought processes, constructive ability, the senses and the power to estimate time, space and speed. The results obtained in the laboratory are entered on a preliminary record-sheet, and the behaviour of the apprentice is observed in the workshop. Works statistics and questionnaires are kept of every operation where attention remains fixed on essential trade components apart from unessential, on the relative importance of single-functions in each process, on comparison of those functions with other functions in one and in several processes, and on determination of the nature, degree and limits of skill in practice. The results obtained from examination of a group of workers, may, at times, be compared before and after the introduction of psycho-industrial selective methods; the time taken by a workman shown to be valuable in the laboratory to become perfectly skilled is followed, and investigation continues as far as the limit of capacity when the breaking-strain in production occurs.

An elaborate series of tests and recording instruments has been invented and put into operation by the various experts among whom Piorkowski, Moede, Giese, Heilandt and Tramm occupy a leading place, and the methods in use, largely through the influence of the Charlottenburg Technical High School, have become almost completely standardised. Special lectures have been held this year in Berlin, at the Orga Institut especially, and visits paid to the firms where psycho-industrial methods are employed, to Siemens and Halske, and the A.E.G. above all. The results achieved may be exaggerated, but the application of scientific management to every element in the modern factory tends to become more and more complete; the standardisation of intelligence and strength attempted by this new school supplies the final stage in rationalisation of industry. It is symptomatic of a great movement spreading over German industry, from the formation of vertical combines to the scientific delimitation of labour; even in its most advanced stages, however, the control of intelligence never becomes wholly automatic, as in America, and intelligence, although no longer free, can exercise considerable influence in this restricted environment. For some, this industrial adoption of experimental psychology gives psychology itself its single great justification, and the enthusiasm with which the whole subject has been examined in Germany, evidently points to the fact that the German love of discipline has merely been brought over into industry, with what success the next decade should show.

# THE PSYCHOLOGY OF FAITH.

By Robert H. Thouless, M.A.

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THE word *faith* is most commonly used of religious faith. In the present article, however, I am not interested solely in this kind of faith. Faith is a mental element which may be present in or absent from the individual's attitude towards his country, towards his work, etc., as well as towards his religion. At the same time, it will be convenient to restrict myself to one kind of faith for the purpose of illustrating what I am saying, and for this purpose I propose to take religious faith.

When we say that a man has religious faith, we mean that he behaves in a way which presupposes that the objects of religious belief are real. Faith may be defined as a mental disposition to behave in this way. The first problem which we meet in the investigation of faith is whether this disposition is necessarily accompanied by an actual belief in the reality of these objects. Certainly it seems natural to suppose that belief must accompany faith, and particularly (although not solely) amongst uneducated persons the mental disposition of faith is accompanied by a subjective certainty of the reality of the objects implied by the faith. If this subjective certainly is even shaken the faith falls. A person with this kind of religious faith loses it when he begins to doubt the existence of God; it is not necessary that he should feel sure of the non-existence of God. Such a faith, we may call *simple faith*. It is a mental disposition to behave in what we may call the religious way, accompanied by a subjective certainty of the reality of the objects whose existence is implied by the religious way of behaving.

With a wider knowledge and a more unprejudiced facing of facts, this simple faith becomes increasingly impossible. It is indeed about such things as demand faith that we find it most impossible to be subjectively certain. The habit of mind implanted by the study of psycho-analysis has made it even more impossible for the members of the present generation to be so certain of any truth that he is not conscious of the case against it. If our great-grandparents could rise from their graves and confront us, they would probably reproach us for our lack of faith. And even if they were pious, it would not be only at our attitude towards religion that they would be shocked; they would be equally puzzled and pained by our attitude towards the British Constitution or towards the marriage laws. The change of attitude in the religious believer is reflected in the change in his method of religious apologetic. A hundred years ago the religious apologist pointed to irrefutable arguments for the existence of God. Now he frequently recognises that there are no conclusive arguments for the existence of God. He must fall back on the method of empirical induction,[1] and he knows that his conclusions can never possess apodictic certainty. He may be satisfied that he has established an overwhelming presumption in favour of the religious explanation, but even this is less than the intellectual support needed for *simple faith.* It must be admitted that when he ends with the claim that the probability of the reality of the objects of religion is sufficiently well established to make it a more satisfactory working hypothesis than its opposite, the modern empirical religious apologist falls far short of the gay confidence of the *Credo* of the religious martyrs. Their faith was the simple faith of complete subjective certainty, and they would have regarded his weighing of probabilities as evidence of a scepticism more dangerous than complete disbelief. They would suspect him of having defended religious belief by a method which made real religious faith for ever impossible. Is this charge justified?

This question leads to the consideration of two important problems of faith. First, we must ask what is the psychological purpose of this subjective certainty which sometimes accompanies faith, what function it fulfils in mental economy. Secondly, we must consider whether it is possible to formulate a conception of faith which does not include this element.

We have already seen that an intense faith is ordinarily accompanied by an unquestioning conviction of the truth of certain propositions; in the case of religion these propositions are those which assert the reality of the objects of worship, the value of the lines of conduct prescribed by religious authority, the worth of religious emotion, and so on. It is true that the religious enthusiast has doubts, but these are felt to be alien elements in his mind which are combated by the rest of his personality. He might bring these partially dissociated mental elements into harmony by freely admitting that they were possible alternatives while retaining the conviction that the religious explanation was right; but, as a matter of fact, he does not do so. The evidence for other explanations than the religious is refused free admittance to his mind, and only has occasional ingress in the form of alien and disturbing "doubts." In short, he retains his religious conviction in a subjectively certain form by the suppression of opposing evidence.

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[1] He may treat religious doctrines as hypotheses, to be tested in the same way as the hypotheses of science by their power of explaining and co-ordinating the facts of experience.

It is not difficult to see why he does this. Action rather than thought is the end of the mental operations of the ordinary man. For effective action this opposing evidence (the minority report of the mind) has no value. On the contrary, so far as it affects conduct, its results are to inhibit the course of action which the mind as a whole has chosen, and so to reduce the effectiveness with which it acts. The man of action making an absolute and uncompromising choice of one of two possible alternatives may be compared to a motorist travelling at speed who suddenly finds his way blocked by an obstacle. He can avoid it by swerving either to the right or to the left. The weight of reason for adopting one course rather than the other may be inconceivably small. But his chance of safety lies in adopting one course exclusively with no thought of the claims of the other. If both possible courses occupy his mind and he steers a middle course between them, disaster is certain. In the same way all decided action is attained by the suppression of inhibitory influences. The patriot who recognises the strength of the case against his own country will not be a good soldier; the religious person who is fully conscious of the case for the non-existence of God will not make a good martyr.

As a result of this uselessness of the mind's minority report for purposes of action, it tends to be obliterated from consciousness. With its repression, the condition of doubt passes spontaneously (as, for example, Starbuck noticed in his study of adolescent conversion) into a condition of certainty, and the painful affect of doubt disappears. A special training of the mind is necessary before it becomes possible for it to hold freely opposing possibilities and to make due recognition of the claims of each. This capacity should be one of the results of academic training, and academic training is always supposed to incapacitate for action.

But the extent of this incapacitation can easily be exaggerated. It has been found possible for persons with this habit of mind to act as usefully as persons with *simple faith*, while they are saved from the irrational fanaticism of the latter. To such persons, faith is not the repression of all possibilities except the one chosen as the guide to conduct. It is the acceptance of one theory of the universe as their guide in action and as a principle claiming their unfaltering allegiance, while they recognise with clear consciousness that they may be giving their loyalty to an empty dream.

This, then, is the answer which I propose to our second problem. The development of habits of mind which make simple faith impossible need not (although indeed it may) lead to the abandonment of the mental attitude of faith altogether. Whether it be in religion, or in politics, or in any of the other activities which make demands on our loyalty, we have still the necessity for acting whole-heartedly and completely in one direction, which is made possible for the man of simple faith by his subjective certainty. Our substitute for this subjective certainty must be a voluntary choice between opposing theories, accompanied by a clear recognition of the strength of the case against the theory we have chosen, and a voluntary refusal to allow this recognition to interfere with the effectiveness of our action.

If this conception of faith be adopted, the place of the empirical method of apologetic in religion becomes clear. A demonstration of probabilities becomes the normal intellectual buttress of faith. The most that faith will ask from its intellectual supporters will be that they shall show a presumption in favour of the hypothesis of faith; the least that it will require will be a demonstration that this hypothesis is not impossible.

Moreover, the influence on conduct of the adoption of this kind of faith will not be entirely loss. If definiteness of action follows from the repression of opposing possibilities, so do fanaticism and intolerance. A clear-sighted faith, fully aware of the weakness of its intellectual support, will lead to tolerance of other persons' hypotheses. If it is less likely to make martyrs than the simpler way of dealing with problems of belief, it is also less likely to make persecutors.

Finally, it may be asked whether this conception has not often been implied in the usage of the word *faith*, even when it certainly has not been its explicit meaning. Very few of the praises of faith would have much significance if their writers had really believed that the evidence for the truth of religion was as convincing as recent papal decrees would have us believe. The glory of the fight would be dimmed for the religious enthusiast if he were absolutely sure that he was on the winning side. The really meritorious martyrdom is that of the martyr who is clearly conscious up to the last moment of his agony that he may be sacrificing himself for a cause whose only existence is in the world of shadows.

# THE BIOLOGICAL FACTORS IN MENTAL DEFECT.[1]

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IN any attempt to arrive at a solution of the problem of mental defect, the first question is whether we are dealing with a unitary condition in which the idiot, the imbecile and the various grades of feeble-mindedness form, as it were, degrees or measures upon a single scale of mental capacity, or whether there are not included under the term a multiplicity of conditions which have been grouped together because they are associated with similar manifestations of conduct, or with similar exhibitions of a lack of intelligence. We must decide whether, to use an electrical simile, the conditions which we describe under the term "mental deficiency" are to be arranged "in series" or "in parallel." Confusion has arisen from the fact that we often fail to discriminate between what are in essence pathological and what are biological factors. Thus we speak of congenital amentia or of mental deficiency existing from birth, and we assume that certain cellular changes in the texture of the brain stand in causal relation with the state of quantitative reduction in mental capacity. On the other hand we regard as evidence of mental deficiency the inability to conform with the social demands which are made by the community of which the individual is a member. We thus make use of two different standards of measurement, i.e., intelligence in the one case and conduct in the other, and there appears to be some probability that we are associating conditions which are not necessarily *ejusdem generis.* In England the educational aspect of mental defect has received a preponderating amount of attention, but in France, where the study of the question has had a different trend, this distinction is more clearly recognised. There the accepted main classificatory division is between "Les anormaux d'intelligence" (i.e., idiots, imbeciles, and arriérés) and "Les anormaux de caractère."

The question which therefore arises is whether the deficiencies in the higher psychical processes which are manifested by the high-grade "moron" or the so-called "moral imbecile" belong to the same order of phenomena as the deficiencies exhibited by the idiot and imbecile. Although in the latter case the defects of those processes which we regard as the normal functions of the brain are correlated with definite cellular changes, it is highly improbable that any histological methods will ever be sufficiently precise to differentiate the brain of the person who has persisted in anti-social conduct, or who could not manage himself and his affairs, from that of one who has been a model citizen. In the one case pathological and organic states, and in the other morbid social reactions are involved. Moreover, a further question arises, whether the distinction drawn between this latter type of mental deficiency and those abnormal mental conditions which we group together under the general term "insane states" is a valid one. In both we use the same criterion of conduct. The Lunacy Act requires the production of evidence as to observed facts of conduct alone, and those persons come within the scope of the Act whose conduct is, or might become, a menace to the community in which they live. The mechanism of the Act is brought into action merely to restrain them till such time as it is presumed that their liberty may be restored to them with safety. In the Mental Deficiency Act, in addition to the observed facts of conduct there are added other factors of a different order, viz., existence from birth or an early age, and the presumption of permanent intellectual incapacity. To the three degrees of mental deficiency enumerated in the Act, there is also added a special group, the "moral imbecile." The inclusion of this special group in the Act constitutes a very real difficulty, and the use of the term "imbecile" is most misleading, for it is here used in its older connotation of "weakness" side by side with its more modern and narrower meaning. When Prichard, in 1835, introduced his conception of "moral insanity," it is clear that he was describing exactly the same type of case as is now labelled "moral imbecility." It is in this sense that Maudsley uses both the terms. (Physiology of Mind, p. 356).[1]

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[1] A paper read to the Psychological Section, British Association, Hull, September 12th, 1922.

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[1] Maudsley, writing in 1867, with that breadth of view and acuteness of vision which characterises all his writings, discusses the question and gives a description of several typical cases to illustrate his view as to the causation of the condition. "The patient may judge correctly of the relations of external objects and events, and may reason very acutely with regard to them; but no sooner is self deeply concerned, his real nature touched to the quick, than he displays in his reasoning the vicious influence of his morbid feelings and an answering perversion of conduct; he cannot truly realise his relations, and his whole manner of thought, feeling, and conduct in regard to himself is more or less false." And again, after giving three examples: "It is quite certain that these three women, so lost to all sense of the obligations and responsibilities of their position, could not restrain their immoral extravagancies and perverse acts for any length of time; punishment had no effect, except in so far as it was a restraint for the time being. All of them knew quite well the difference between right and wrong, but no motive could be excited in their minds to induce them to pursue the right and eschew the wrong; . . . such patients feel no shame, regret, nor remorse for their conduct, never think that they are to blame, and consider themselves ill-treated by their relatives when they are interfered with. . . . The victims of such vice or defect of nature cannot be fitted for social intercourse."

The anomalies of the higher psychical functions, the egocentric trend, the lack of the power of judgment, and the general unreasonableness and inapproachability of these "moral deviates" proclaim a nearer affinity to the Paranoic than to the simpler and more protean state of idiocy and imbecility. With the characteristic behaviour changes in Dementia praecox the similarity is still more striking, indeed, very often the history of the development of the mental state is the only guide to a diagnosis. Even if it be granted that such persons can be found to show some defect in intellectual capacity, it still remains to be determined whether the presence of this defect always stands in causal relation to, and is to be correlated with, their anti-social actions, or whether it may not be the chance result of the general distribution of mental capacity through the whole community.

An analogy from chemistry will perhaps serve to illustrate my meaning. The addition of silver-nitrate to a solution will reveal by a precipitate the presence of the chlorides of certain metals, but in order to determine which of these metals is present certain further tests are necessary. Conduct is the group-reagent by which the presence of mental deficiency is indicated, but to determine the species which is present further tests are necessary. Intelligence tests may be regarded as one of the reagents which helps towards a further subdivision, but we cannot predicate behaviour from intelligence tests alone. On the other hand anti-social conduct, even when grave and persistent, cannot be regarded, in the absence of other factors, as an index of that type of anomaly of the mental processes to which we attach the label "mental defect." Defective intelligence is not the main factor in the aetiology of crime, and the majority of those who break the laws are not found to be mentally deficient in the ordinary connotation of the term. Law is, after all, but the enunciation of certain canons of conduct by the community for its own protection and preservation, and crime may be defined as an action which at a particular time and in the opinion of a particular community is considered to injure or to tend to injure that community, or abstention from action which is in the common interest. Many actions which are criminal at one stage of social development are not so considered at another. The converse is equally true. Hence responsibility, whether in the legal or ethical sense, must vary with the complexity of the environment and with the reactions of which human conduct is the product.

The social virtues such as honesty and law-abidingness, which belong to that mass of traditional law which is the strength of all social institutions, have as their basis those instinctive tendencies which not altogether happily are grouped under the term "the herd instinct." Not altogether happy, because the word "instinct" seems to exclude the influence of the ceaseless flow of suggestions which pours in upon us from the earliest days of our lives. The term "Group mind," suggested by McDougall, is preferable, for it obviates the ambiguity introduced by the use of the word "instinct." This stream of suggestion is in reality the chief agent in the transmission of the so-called "social virtues," such as forbearance, consideration for the feelings and interests of others, and the impress of our national and individual characters. Our social habits, our customs and our prejudices, our religious outlook, and even our laws can be traced to this susceptibility to suggestion. Thus Barker[1] writes: "As a child grows, the community in which he lives pours itself into his being in the language he learns and the social atmosphere he breathes, so that the content of his being implies in its every fibre relations of community." The force of this stream of suggestion is the resultant of the degree of cohesion and complexity of the community and the ethical standard of its members at the particular period, hence as Professor Gilbert Murray[2] has pointed out: "Not only in early Greek times, but throughout the whole of antiquity the possibility of all sorts of absurd and atrocious things lay much nearer, the protective forces of society were much weaker, the strain on personal character, the need for real 'wisdom and virtue' was much greater than it is at the present day."

The older theories of the development of the social organism have been profoundly modified by the biological conceptions of recent years. If the growth of the social organism is found to be governed by biological factors, it would appear to be inherently probable that mental deficiency, one of the chief weaknesses of the social structure, should also be conditioned by the same factors. If this is a true interpretation of the facts, we must look for different processes at work in the causation of the types of deficiency described above, and determine whether some of these may not be phylogenetic in their development.

Light is thrown upon the problem when we examine it from this biological standpoint.

In the long process of evolution which has brought man to his present pre-eminence in the world, as his powers of intelligence and his domination over Nature have developed, there has been an enormous increase in the number and variety of the stimuli, social and ethical, which pour in upon him and in the range of response which is called forth. The scene of the struggle for existence has shifted more and more from the material world—the conflict with the forces of Nature for bodily nurture, self-preservation, and the expression of his primitive instincts—to that of the sphere of morality and ethics in which a rational intelligence plays a preponderating part. The race is no longer to the swift or the battle to the strong, and Man has indeed become a "living spirit." Survival of the fittest has thus increasingly become a socio-psychological problem, for only by the subordination of the individual interests and desires to the behests of the social unit can its cohesion, and hence its continued existence, be secured; yet it is upon this cohesion that the safety of each member depends. The complexity of the nexus which binds the members together for their mutual protection and support is the measure of the degree of conformity to its standards that has been acquired. But in this evolution, ever more and more rapid, man's social environment, with its ever-increasing demands upon him, has outstripped the power of a certain proportion of the individual members of the community to adapt themselves to meet it. So long as the changes of environment and the capacity of the individual to meet them are progressing at an unequal rate, the relativity between the two factors is not static but unstable. Till the tide of social development ceases to advance there will be an increasing amount of human wreckage and social wastage cast upon the shore.[1] These social inefficients, who cannot meet the demands made upon them by the environment in which they live, and who cannot make the necessary self-adjustments to compete successfully in the struggle, are the unfavourable variations. If the use of the term in this sense is permissible, they may be said to be lacking in that Symbiotic adaptability which is the basis of communal life. To attempt to persuade such persons by logical reasoning to take an altruistic view of life is as futile as it is to attempt to reason a Paranoic out of his delusions. If this be a true explanation, then the presence of such persons in our midst is the price which we pay for our social development and our civilisation.

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[1] Quoted by Macdougall, op. cit. p. 18.

[2] "Some Aspects of Greek Religion," p. 162.

The late Dr. Rivers has formulated a biological theory of the genesis of morbid mental states, based upon our knowledge of the evolution of the nervous system, which appears to give us an entirely new view-point, and may afford an important clue to the solution of the problem of the origin of this type of mental deficiency. It is therefore necessary to give a brief outline of the facts upon which this theory is based.

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[1] Conklin, "Heredity and Environment," p. 314.

From experimental investigation in connection with division of cutaneous nerves and from clinical experience, Dr. Henry Head and Dr. Rivers have concluded that there are two distinct stages in the evolution of the nervous system.[1] The most primitive of these is the "protopathic" stage in which the sensations are crude and vague in character, without definite discrimination, localisation or power of recognition of the nature of the body in contact. These protopathic sensations have a pronounced affective tone, generally tending to the unpleasant side rather than to the pleasant, and are associated with such movements as would withdraw the part stimulated from contact. Such sensations thus give a general awareness only, but they are sufficient to direct the primitive forms of life in their approach-to or retreat-from the source of stimulation. In the course of evolution a second stage of sensibility has made its appearance. This has a much more sharply defined and localising character, which allows the nature of the stimulus to be recognised, and thus enables more complex and directive response and modifications of behaviour to be made. It is clear that if this so-called "epicritic" sensibility is to have full play there must be a suppression of the more primitive protopathic sensibility, the result of which would interfere with or counteract the finer reactive adjustments to the epicritic sensibility. It is found, however, that there is not a complete suppression but a fusion of a portion of the protopathic sensibility with the epicritic.

But there is another difference between these two forms which is of supreme significance, a proper understanding of which is of fundamental importance. This is the phenomenon known to physiologists as the "all-or-none" reaction, which is exhibited by the protopathic behaviour in response to stimulation. The special feature of this reaction is that there is no gradation in the response, that is, if there is any response at all, it tends to occur in full strength. In the epicritic stage of sensibility there is a much finer and more complex response, graduated in character according to the nature of the conditions whereby it is produced. If we may without flipancy apply a phrase of Wordsworth's, we may describe it as a "nicely calculated less or more" reaction.[2] Intimately associated with the protopathic sensibility are the primitive instincts of self-preservation and self-propagation with their accompanying powerful but crude affective tones.[1] Rivers goes on to say: "A character common to emotive reactions and protopathic sensibility is their immediate and, as it were, unreflective character, 'the reactions of protopathic sensibility . . . are quite beyond the control which we normally exert over our reasoned movements,' while the discriminative and reflective activities of certain forms of behaviour of man resemble in character these epicritic sensibilities with their associated activities" (p. 48).[2] He was led by Dr. Hughlings Jackson's theory of mental levels to set up a close parallel between these stages of sensibility and the higher intellectual processes, and his experience of war neuroses brought him to see in their morbid manifestations the same type of action, viz., a suppression, or a removal of, the control by the higher and more recently developed acquired mental activities over the more primitive ancestral characters. Thus, "he came to suppose that the instincts associated with the needs of the individual and with the early preservation of the race are mainly of the protopathic kind, whereas the epicritic group of instincts first appeared with the development of gregarious life."[3] In the course of mental evolution, owing to the development of intelligence, these epicritic characters are super-imposed upon, fuse with, or displace the earlier protopathic characters of instinctive behaviour.

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[1] Rivers. *Instinct and the Unconscious.*

[2] "High Heaven rejects the lore
Of nicely calculated less or more."
*Sonnet on the Interior of King's College Chapel.*

"The process of suppression by which elements of conscious experience pass into the 'unconscious' is of the same order as the suppression which takes place on the sensory-motor and reflex levels. A number of processes have been found which form intermediate links connecting the suppression of highly complicated mental process at one end of the series with the suppression necessary for the perfection of reflex action at the other end of the series. In all cases we have to do with the means by which behaviour, whether of human being or animal, is adjusted to the needs with which man or animal is confronted. . . . Every living process of the animal involves, not only activity devoted to the special end the animal has to meet, but also the inhibition of tendencies to activity of other kinds. . .

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[1] Rivers further attempts to shew that "if we recognise acquisition as an instinct, this must be regarded as primarily an offshoot of the instinct of self-preservation which manifests itself strongly in connection with the sexual and parental instincts and plays a part in the higher development of the gregarious instinct." Thus acquisition, according to him, may be regarded as primarily protopathic in character.

[2] Rivers. *Instinct and the Unconscious.*

[3] Myers. Presidential Address, British Association, Psychology Section, 1922, p. 11.

It is now recognised that the activity of every functional unit of the nervous system is of two kinds. Every unit forms part of a hierarchy in which it controls lower, and is itself controlled by higher, elements of the hierarchy.'"[1] Such is the gist of Dr. Rivers' theory. He regards the ordinary healthy mental state to be one of equilibrium between the protopathic instinctive tendencies and the epicritic forces by which they are controlled.

If, in order to determine the validity of this theory of a two-stage evolution of the nervous system, we turn for corroboration to our knowledge of the development of the brain, we find a striking confirmation. Head[2] has shown that the Optic Thalamus, the most important element in the primitive Central Nervous System, is the sensory centre in which afferent impulses evoke sensations expressed in consciousness as a crude awareness to contact, heat, cold, and pain, with their accompanying affective tones, pleasant or unpleasant. It is essentially the organ by which attention can be concentrated upon any part of the body. The Thalamus is, however, connected with certain areas of the cortex which forms the main part of that much later development, the Neopallium. The growth of the Neopallium out of the primitive receptive olfactory instrument has provided a unifying agent for the blending in consciousness of these sensory impressions which reach it from all parts of the body, and endows them with spatial qualities, intensity and relativity, and allows their revival in associative memory. It is, moreover, a storehouse of memories of past sense impressions. The Thalamic system is thus phylogenetically older than the cortical system. To quote Dr. Head again: "In the light of this development of the Neopallium, it may be stated that the aim of human evolution is the domination of feeling and instinct by discriminative mental activities."

There is thus a close parallel between the protopathic and epicritic sensibilities of the afferent nerve tracts and the relation of the Optic Thalamus to the Cortex, and the attributes peculiar to the former can be said to be related with the protopathic system and the latter with the epicritic system. We are thus in a position to correlate the degree of epicritic control with the adequate functioning of the cortex, which in turn ultimately depends upon the integrity and complexity of its cellular components. How, then, can we apply these facts to the phenomena of the behaviour exhibited by the mentally deficient? The lowest grade of idiot, who maintains no more than a vegetative existence, shows little more consciousness than a crude awareness of the pleasant or unpleasant tone of the stimuli which reach his consciousness. He will swallow anything placed in his mouth, however nauseous, and has not sufficient associative memory to perform the simple co-ordinated movements to protect himself from a blow or a fall. His response to stimuli are largely without discrimination, and partake of the "all-or-none" character. He has not advanced beyond the protopathic stage of evolution. In proportion as we ascend through the lighter degrees of idiocy and imbecility, we find that the behaviour can be interpreted in terms of degrees of epicritic control—a behaviour which can be correlated, as our knowledge of the normal functions of the brain teaches, with definite quantitative reduction or alteration of the cellular basis and organisation of the cortex. It is, however, when we come to consider the behaviour of the higher grade cases that this theory seems to throw most light upon the problem.

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[1] "Instinct and the Unconscious," p. 31.

[2] Brain, 1919. See also Elliot Smith, *Croonian Lects.*, 1919.

The essence of a gregarious or communal life is clearly the subordination of the individual desires and activities to the interests of the community as a whole, and it is manifest that the influence of the latter is mainly inhibitive in character. It entails the suppression of the instinctive tendencies of each member in order to meet the new demands now made upon him. The gregarious instinct is thus, according to Rivers, an epicritic character. The chief feature which marks the feeble-minded is an inability to adjust himself to the calls which are made upon him by his environment, while the chief manifestations of that inability is the commission of acts which are anti-social, i.e., contrary to the demands made by the highly complex organisation of modern life, which has had its origin in the gregarious instinct of the human race. To a large extent the anti-social actions of the feeble-minded are clearly and definitely the expression of uncontrolled, or, to use Rivers' term, "unsuppressed" primary instincts, and sexual offences, crimes of violence, arson, and stealing form the great bulk of the criminal deeds of such persons. There has been a failure of function in the hierarchy of mental control. Now, as has been already pointed out in this paper, one of the distinguishing features of the herd is suggestibility. This openness to suggestion is of great intrinsic importance, for it is eminently protective in origin. It is clear that a readiness to take unconcerted but common action, such as is seen in the simultaneous rising of a flock of birds on the approach of an enemy, the flight of a herd of wild animals, or the synchronous movements of a shoal of fishes, is necessary to preserve the cohesion, and thus the mutual protection, of the whole. This harmony of action is produced by the suppression in each individual of his self-awareness with the subordination of the self-preservative tendency to independent action to an unwitting domination by the suggestion of a common danger. According to Rivers, " suggestion is essentially a process of the unconscious," which is closely associated with the protopathic stage of evolution. When we consider the behaviour of an unorganised crowd, as distinct from that of a body of persons actuated by some common bond of pre-determined action, we see that the collective mental state is characterised by heightened emotional excitement and suggestibility, and that each member " loses his sense of personal responsibility. He is carried away and does not feel called upon to maintain the attitude of self-criticism and self-restraint which under ordinary circumstances are habitual to him, and his more refined ideals of behaviour fail to assert themselves."[1]

Hence, as McDougall points out, a crowd is more thoughtless, more callous and cruel than an individual. For example, a normally constituted person would probably not have been willingly the sole spectator of the martyrdom of Christians in the arena. It may be remarked that love of cruelty is, however, often a marked feature of the mentally deficient. McDougall thus describes the psychological characters of an unorganised crowd: " Excessively emotional, violent, fickle, inconsistent, irresolute, extreme in action, displaying only the coarser emotions and less refined sentiments, extremely suggestible, careless in deliberation, hasty in judgment, incapable of any but the simpler and imperfect forms of reasoning, easily swayed and led, lacking in self-consciousness, devoid of self-respect and of the sense of responsibility, and apt to be carried away by the consciousness of its own force."[2]

Now the object of training, whether it be military or to secure obedience to the ordinary dictates of society, is to promote control of action by the super-position of another type of activity more consonant with its aims. It will be admitted that for a description of the behaviour of the feeble-minded as a class no words could be found which more accurately describe it than the above description of the psychology of a crowd. In both cases the conduct is characterised by an absence of that control which the community endeavours to inculcate upon all its members. In the one case it would seem that the epicritic control is temporarily suspended, in the other that it has never developed or is present in a rudimentary degree only, but the conduct is on the same level in both cases. In both there is the same imperfection of judgment, in both the suggestibility and impulsive reactions. In the case of the crowd the conduct has the appearance of a regression to a more primitive stage of social evolution. Further, many of the peccadilloes and misdeeds of later child-life and adolescence, which bring the actors within the purview of the law, are now recognised to have their basis in some conflict or repressed experience. I believe that many of these actions, such as stealing, damaging property, etc., can often best be explained as regressions to an earlier period of infancy or childhood (which itself reflects a corresponding stage in man's phylogenetic development), when there is as yet no clear distinction between "tuum" and "meum," and there exists a tendency to collect and store with little regard for the intrinsic value of the objects collected. We can apply the theory of regression to another type of conduct. The misdemeanour of breaking things, so grandiloquently described on the charge sheet as "wilful damage to property," is often little more than an expression of the baby's delight in breaking his toys. Again, the fascination of a fire, fireworks, or playing with matches for all children, and, indeed, for "children of a larger growth," is well known, and it does not appear altogether fanciful to look upon apparently motiveless arson as a regression to that very early stage in man's history, when the making of fire must have been of such vital importance to his comfort and existence. The desire for warmth, for food, and the anxious expectancy and provoking failures, which his primitive implements doubtless entailed, must have given a strong emotional tone to his efforts, and probably caused a mental tension only second to that of hunting his quarry. Fire-raising may thus be regarded in the light of an expression of an instinctive behaviour. Dr. Golla[1] gives an exceedingly interesting parallel example of an instinctive action of this kind, viz., the nest-making instinctive tendency in human beings. He draws attention to the great frequency with which an expectant mother, on the near approach of parturition, will set about tidying up drawers, sorting papers, etc. This action, he considers to be the expression of the nest-making tendency, which is almost universal amongst the higher apes. The reason that is generally given for this action is that, as she is about to be laid up she wants to get the house straight and tidy. This is clearly a rationalisation, and the explanation given "is not only false, but shows no associational nexus to the true purpose of her activity." Another example of the removal of the control by the higher intellectual level is seen in the automatism of epilepsy. Here the removal of the epicritic control opens the way to suggestibility. A knife suggests cutting, a woman a sexual opportunity; a road suggests a walk along it, and so on.

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[1] McDougall, " The Group Mind," p. 40.

[2] McDougall, op. cit. p. 45.

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[1] Croonian Lectures, June, 1921.

An interesting confirmation of the theory outlined above is supplied by the recent experiments of Mr. W. Whately Smith on the effects of alcohol on emotivity. These go to show "that in addition to an all-round raising of the threshold of emotional response, the effect of alcohol is to cause a regression to a more primitive, all-or-none or protopathic type of reaction." Commenting upon these results, Mr. Smith writes: "It has often been suggested that a person under the influence of alcohol approximates to a more primitive type, as is indeed often obvious from his behaviour. But here we have concrete experimental evidence, based solely on measurement, that this is actually the case. This appears to me to harmonise with the point of view which stresses the gradual transition from protopathic to epicritic modes of reaction, on the psychological in addition to the physiological levels, as organisms rise in the evolutionary scale."[1]

If we turn to another aspect of mental activity, i.e., that of intelligence and educational capacity, it seems reasonable to suppose that the wide variations which show themselves find their most satisfactory explanation on a biological basis. If we accept the two-factor theory of intellectual capacity, we regard this capacity for making mental acquisitions or for the performance of intellectual functions as the product of two distinct factors, viz.: (1) A general intelligence factor, dependent upon the energy of the brain as a whole, innate, and following the biological laws of heredity; and (2) Certain specific factors, each correlated with the activity of specialised systems of cells more or less localised or focal in definite areas of the cortex. These serve for the acquisition of particular mental processes by education and training. The wide application of intelligence tests has shown that general mental ability has a symmetrical distribution of the same order as have physical characteristics such as height. It is therefore clear that, if there were no factors which upset this distribution about a mean along a normal curve of frequency, the low grade idiot would be as rare as a genius. As this is demonstrably untrue, it is evident that there must be certain disturbing factors, which produce a skew deviation of the curve of distribution and bring a much larger number into the lower ranges of intelligence than would be predicted by mathematical calculation. Endocrine disturbances, toxic processes, congenital syphilis, and the like, accidents, etc., are disturbing factors of this kind.

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[1] "Measurement of Emotion," p. 138.

While there is a general interdependence of the two factors upon one another, yet they vary independently.

General intellectual capacity can thus be described as a function of two variables, but there are certain characteristics of the distribution of the specific educational capacities which show that this, too, is governed by biological factors. The necessity for the ability to read, write, and calculate, and for those other acquisitions which play so prominent a part in the education and social demands of to-day, is the outcome of an environment that is but a few generations old. It cannot, therefore, be expected that demands for a whole new series of functions will be met by a sudden and universal appearance of the specific mental capacities which are required. A study of the educational disabilities shown by the children who fail to progress in school at the same rate as their quicker-witted fellows, prove this to be the case. On the other hand it may be expected that recent acquisitions will show more instability and wider variations than those of more ancient date, both in the degree acquired and in the time of their appearance. The commonest defect is that of an inability to learn to read and to write, i.e., to acquire the power of recognition of word or letter symbols. This common defect of word-blindness may be either partial or complete, transient or permanent. It is far more frequent amongst boys than girls, and there is some evidence that its transmission follows the same course as other sex-limited diseases, viz., through the female line but with manifestation in the male line. Warburg states that there is a hereditary predisposition in 75 per cent. of cases. It is most frequent in the poorer sections of the community. When we remember that, even so recently as ten generations ago, the great majority of persons were totally illiterate, it is hardly to be wondered at that the mental mechanism involved in the acquisition of reading has not yet become uniform in action. On the other hand, speech is the oldest distinctively human special capacity. Hence we find that, as we should expect, *a priori*, it has long become stable and that there is little variability in the time at which it makes its appearance (i.e., fifteen to eighteen months) and, further, that the longer the delay the greater is the likelihood of the presence of a mental deficiency. Hence, too, the defect known as word-deafness, i.e., an inability to recall the meanings of sound-symbols is one of the rarest defects which are to be found in children. Mathematical ability shows still greater variations. When Francis Galton set himself to investigate the distribution of intellectual capacity and hereditary genius, he took as a measure of the wide differences in mathematical ability the number of marks which separated the Senior Wrangler from the next in order in the Tripos, and from the lowest in the list—the winner of the "Wooden Spoon." In a very large number of persons the capacity for forming mathematical conceptions remains very rudimentary. Dr. A. R. Wallace,[1] in commenting on this fact, writes: "Probably fewer than one in a hundred really possess the mathematical faculty, the great bulk of the population having no natural ability for it." On the other hand, this special capacity has more rapidly reached a higher development than any other, culminating in the mathematical genius of such men as Newton, Gauss, Laplace, or Rayleigh. But another feature of this capacity has an important bearing in the question, i.e., the tendency to precocious appearance, a tendency which is, from the nature of the case, more easily recognisable than is precocity in the attainment of reading. The "Calculating Boy" is a well-known phenomenon, and the fact that this precocity is entirely confined to boys is itself evidence that there is some biological factor involved. The distribution of exceptional musical talent shows a general likeness to that of mathematical ability. There is the same tendency to precocity, and the same large difference between the musical genius and the "good musician." Wallace[2] remarks: "The gradations in musical faculty are quite as great as in mathematical or pictorial art, and the special faculty of the great musical composer must be reckoned many hundreds or thousands of times greater than that of the ordinary unmusical persons, who seem absolutely deficient in musical perception." On the other hand there is reason to believe that in a large number of persons these special capacities are delayed in their emergence. This is certainly true in the case of the capacity to acquire the power to read and write. It is by no means uncommon that a person, who has left school almost or quite illiterate, has acquired this power during later adolescence, though he may continue to be persistently a bad speller, and does not read with manifest ease and enjoyment. This delayed emergence does not, however, determine final incapacity, nor is it necessarily associated with a diminution of general intelligence. Thus Wallin,[1] in a recent paper, has shown that in 85 consecutive cases of word-blindness the Intelligence Quotient varied from 54 to 104, and that only 5·2 per cent. graded as feeble-minded. It is to this phenomenon of delayed emergence that I have applied the term "larval." The introduction of a new term always demands some justification, but the analogy is a close one, for the condition is really analogous to the phenomenon of "neoteny," i.e., the persistence of larval characters into later periods of adult life, which is found especially among the Amphibia. Thus the Axolotl, long considered to be a distinct species, is now known to be a persistent larval form of *Amblystoma tigrinum.* Modern educational methods have tended to give an undue prominence to the subnormal development of certain capacities, e.g., those for reading and writing or calculation, whereas deficiency in musical aptiude, tone-deafness, or lack of perceptive capacity for form and colour are identical in character. If all the community were musicians or artists, the persons who showed these deficiencies would appear to be feeble-minded in contrast with their normal fellows, and if the conditions persisted into adult life, such persons would not, in the terms of the Mental Deficiency Act, "be able to compete on equal terms with their fellows." When we consider the exhibition of general intelligence we find evidence of a high degree of variability, and the same type of precocious or of delayed emergence, irrespective of the degree of development of the special capacities. The attainments of such "Wunderkinder" as Francis Galton, Lord Macaulay, or Marjorie Fleming, the little friend of Sir Walter Scott, are a proof of this precocious development of general intelligence. But that these general and special capacities may vary independently is shown by the fact that there is sometimes associated with the precocious or exceptional development of a special capacity a reduction in the general intelligence to such an extent that the individual is quite unable to manage himself and his affairs, and thereby belongs to the group of *idiots savants.* Some of the well-known "calculating boys," or "lightning calculators" have shown very meagre general intelligence. Dase, for instance, who retained his calculating abilities throughout life, was but little above an imbecile, and could never master the simplest problem of Euclid. Many other cases have been reported.

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[1] "Darwinism," p. 470.

[2] "Darwinism," p. 471.

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[1] *Lancet*, 1921, p. 890.

It is, however, that high correlation between parents and offspring which is signified by the terms as "heredity," "inheritance," "hereditary,"[1] so frequently present in cases of mental abnormality, which supplies one of the strongest and most irrefutable arguments in favour of the operation of biological factors. The frequency of consanguinity amongst those whose mental balance, unequal to the stress of life, is overthrown, thus precipitating an attack of insanity, is evidence of this high correlation, as also is the occurrence of multiple cases of certain forms of mental defect, or the co-existence of insanity and mental defect, in the same family. Similarly, as has been pointed out above, the special capacities such as mathematical and musical ability, and that highly developed all-round intellectual capacity which is designated "Talent," show the same high heredity correlation. On the other hand, a very large number of cases of mental deficiency of every graduation occur sporadically in families of average or more than average intellectual ability, apart from those special types of defect, Mongolism, Microcephaly, Cretinism, and the like, which clearly belong to a different order of phenomena and suggest the existence of some specific causative agent.

The facts which we have adduced appear to support the view that the distribution of both general intelligence and the specific educational capacities follows definite biological laws. The evidence appears to warrant the division of mental deficiency into two main groups, which may be broadly considered as phylogenetic or ontogenetic respectively, and may be termed the Evolutive and the Devolutive types. In the Evolutive type the forces of evolution have not brought the child up to the average mental level demanded by our social and educational systems; in the Devolutive type accident, the toxic processes of disease, or of endocrine deficiency, have exercised a deleterious influence upon the cellular structure of the brain that has produced those degenerative changes which bring down their mental potentialities below that level.

The physical characters of the two types are strikingly different. Certain physical peculiarities which have long been known as "stigmata of degeneration"—monstrous heads, coarse features, ill-shaped ears, anomalies of hair distribution, etc.—are very common in the Devolutive group, but are conspicuously absent from the high-grade feeble-minded and the moron. The great majority of these differ in no wise from the average physiognomy of their social class, while some possess in an exceptional degree a refinement of features and physical beauty which serves as a mask to their real character.

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[1] cp. Lloyd Morgan, "Eugenics and Environment," p. 9.

It must be admitted that this distinction of biological types is not as sharply cut or as clearly defined as this statement would appear to suggest, for not only are the interactions of the stimuli which reach the brain, and the responses called forth infinitely numerous, but both evolutive and devolutive processes may be at work simultaneously in the production of mental defect. I believe, however, that this differentiation of two groups is of real practical importance, for the outlook in the two cases is essentially different. For the first group there is a reasonable prospect that by careful training these developmental deficiencies may be eked out sufficiently to render the individual capable of self-support in, it may be, a lowly sphere of life, and of that control of conduct which is the prime essential of citizenship. But for the members of the second group the defect is irremediable, and they will remain throughout their lives a burden on the community which no system of education or training can remove.

In one of his Aphorisms, Lord Bacon[1] expresses a fundamental truth: "*Natura non nisi parendo vincitur.*" If the existence of biological factors in the production of mental defect is established, then we are driven to the conclusion that no eugenic measures, however energetic, except in so far as they are based upon biological principles, can offer an immediate panacea for the solution of this problem which faces every civilised nation.

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[1] Novum organum. Book I. Aphorism iii.

# PREMONITION.

### By E. Eales.

ON the 26th of November, 1916, Emile Verhaeren had been giving a lecture at Rouen. On arriving at the station with but little time to catch the train from Paris onwards, he slipped and fell between the platform and the slacking train. Raised a few instants later with both legs crushed, and carried into the waiting-room, he expired shortly afterwards, having with his dying breath linked the two loves of his life in the faintly-uttered words: "My wife! My country!"

So passed away—victim of a stupid accident—Belgium's greatest poet and one of the great poets of this century, a man whose name will ever remain written in gold as being a famous Patriot as well as a famous Poet. But the object of this short article is not to discuss Verhaeren in relation to his life and work, but rather to point out a certain premonitory strain that runs through his poems when he speaks of the part played by machinery, as if the tragic ending to his own life was already projecting its shadow over his writings. Turn where we will we are struck by the fact that Verhaeren nearly always depicts such everyday commonplaces as stations, engines and trains as objects of terror, and assigns to them a very considerable rôle in life. And it is interesting to read what another well-known writer, Maeterlinck, has to say on this very subject of half-unconscious dread of certain things, persons and places. He sees in this dread, the warning cry of Destiny, and in his book *L'Hôte Inconnu*, he touches upon the strange and often inexplicable warnings uttered by some mysterious voice to certain individuals at one or other moment of their existence, and advances various theories to account for them. In one of the chapters of this book, he laments that the "hôte inconnu" who utters the warning cry does not always speak clearly, and that it is only when the doom of Destiny has been fulfilled, that the significance of the premonition has become clear. Have we reason to re-echo his regret in thinking of the untimely end of Verhaeren and of the brutal fashion in which the thread of his life was cut? When we read his lines:

> "Oh toi, le voyageur
> Qui t'en allais triste et songeur
> Par ces gares du feu, qui ceinturent le monde,"

do we not almost seem to hear the warning voice add the word "Beware!"? Are not his lines in the "Multiple Splendeur" extraordinarily clairvoyant, and are we not forced inevitably to the belief that the "hôte inconnu" warned the great poet that the forces of Nature, rendered subservient by Man, would one day revenge themselves on him where

"le lent défilé des trains funèbres
Commence avec ses bruits de gonds;
Et l'entrechoquement brutal de ses wagons
Disparaissant,—tels des cercueils—vers les ténèbres."

Everywhere and always the Poet bears a close relation to the Prophet, and the Ancients had but one word to express both poet and seer; more than one poet has dimly foreseen the manner of his passing; Shelley, not to mention others, is an illustration of the fact, then why should not Verhaeren, too, have heard the warning voice? . . When he wrote that "le monde est trépidant de trains" and that everywhere one heard "le tonnerre de leurs roulants essieux," had he not a haunting foreboding of the part a train would play in ringing down the curtain of this act of his Life? . . . And when we read such lines as the following can we help believing in the Poet's presentiment, and are we not justified in calling him a Seer, forewarned by that mysterious "hôte" of the tragic death that awaited him?

"Des cris! et quelquefois de tragiques signaux
Par au-dessus des fronts et des gestes des foules.
Puis un arrêt, puis un départ,—et le train roule
Toujours avec son bruit de fers et de marteaux."

# THE PROBLEM OF INDUSTRIAL FATIGUE IN GREAT BRITAIN.

BY MONA WILSON (MEMBER OF THE INDUSTRIAL FATIGUE RESEARCH BOARD).

THE problem of Industrial Fatigue will be treated in the following pages from a sociological rather than a technical standpoint, because the main interest in such research for the general reader must lie in the possibility it offers of removing causes of labour unrest, and of promoting a new spirit of contentment in the industrial world. It will be shown that the results of scientific research, however hopeful and valuable in themselves, cannot be adequately utilised without a fundamental change in the relations between employer and employed. There are, however, indications that the interest awakened in this question of Industrial Fatigue may be instrumental in effecting such a change.

Until recently no systematic study of Industrial Fatigue had been undertaken in Great Britain. This grave omission is the more remarkable because the industrial revolution was initiated in this country, and the expansion of industrial development was specially rapid. In the early nineties, Messrs. Mather and Platt, the well-known firm of engineers, abolished pre-breakfast work, and reduced their hours from 54 to 48 per week, with a consequent increase of production, but although their example in establishing an eight hours' day was followed in the Government arsenals and ship-yards, no general enquiry resulted into the optimum period of employment for different trades. In 1913, the Home Office accepted an offer from Dr. A. F. Stanley Kent, Professor of Physiology at Bristol University, to undertake a series of experiments in connection with Industrial Fatigue, and in the same year the British Association appointed a Research Committee for the purpose of investigating fatigue from the economic standpoint. The supreme emergency of war afforded a further necessary stimulus, and in 1915 a Health of Munition Workers' Committee, appointed by the Government, investigated the effect of long hours of work upon output and health, accident incidence and lost time in munition factories. The striking results obtained by this Committee led to the establishment of an Industrial Fatigue Research Board in order that similar investigations should be made into other trades under ordinary conditions. The hysterical demand for economy, true and false, led to a proposal to close down the Board in 1920, but largely owing to the protest of the Labour Party in the House of Commons, the Board was reconstituted under the Medical Research Council. A Labour Member of Parliament was appointed chairman, and expert scientific committees were set up in addition to those already dealing with industrial problems in various trades.

It cannot be sufficiently emphasized that the whole problem of Industrial Fatigue was completely changed by the transition from War to Peace. While the country was engaged in a life and death struggle, the production of maximum output in those trades affected was of paramount importance; industrial workers had to be considered as instruments for winning the war, to be used at full pressure consistent with the attainment of the immediate object, and time did not allow of prolonged research and experiment. But even so it was found that excessive hours defeated their own object, namely, increased output, and the recommendations of the Committee led to considerable curtailment and rearrangement of periods of work, and diminution of Sunday labour, with beneficial results on output; conditions of employment were improved and amenities such as canteens and the provision of recreation were added. It is probable that there is now in most trades little muscular fatigue which can be regarded as pathological or cumulative fatigue, though investigation might perhaps show that the latter exists among married women, who may be subjected to a continuous strain by the additional burden of home duties during those hours which should be occupied in repose and recreation. The new Board was therefore confronted with the more delicate and subtle problem of discovering the best means of avoiding unnecessary mental and nervous fatigue by means of ameliorated conditions of employment, curtailment or rearrangement of hours of work, and improvement of methods in order to secure to industrial workers the greatest measure of physical fitness and mental contentment, together with a surplus of energy for the enjoyment of home life, recreation and the pursuit of intellectual interests. An increase of output and efficiency will assuredly follow, but it was essential, especially while nerves are still racked by the strain of war, and by its legacy of economic consequences, that it should be clearly understood that the aim of the Board precluded the exploitation of the workers in the interests of maximum production by means of pseudo-scientific methods entailing "speeding up" and "driving." Unfortunately phraseology has itself been an obstacle because such terms as "scientific management" and "efficiency" are apt to create prejudice. Representatives of employed as well as of employers have been appointed as panel members on committees dealing with industrial inquiries, means have been taken to explain the objects of the Board to workers in factories where investigations were carried on, a circular was addressed to Joint Industrial Councils, and conferences have been held with Trade Union representatives.

An idea of the magnitude of the problem of Industrial Fatigue may be gained from an account of the Board's experience in relation to some of the matters investigated, but this experience is mainly valuable in illustrating the need for exhaustive detailed research covering a wide field.[1]

The pursuit of an occupation for which the worker is ill-adapted either mentally or physically involves constant strain. The right choice of employment is, therefore, an important factor in the prevention of unnecessary fatigue. Moreover, the high rate of labour turnover during the early months of employment, exhibited in a number of records analysed for the Board, indicates that many operatives drift into work for which they are ill-suited, and the consequent waste of training and necessity for making a fresh start must undoubtedly have a depressing effect.[2] The question of vocational selection, therefore, clearly fell within the reference of the Industrial Fatigue Research Board, and some experimental investigations have been undertaken.

The method by which apprentices are chosen for the printing trade is notoriously unsatisfactory. The selection is determined by appearance, manner, and the standard reached in an elementary school, with sometimes the addition of unstandardised educational tests; stress is laid on the candidates' acquirements, but his natural endowments are for the most part ignored. This trade was one of those chosen by the Board for enquiry, and an attempt was made to define the aptitudes required for a successful hand compositor. The procedure followed by the investigator was, firstly, to determine by observation the probable capacities required; secondly, to select appropriate tests calculated to reveal such capacities; and, finally, to try these tests on a number of working compositors in order to ascertain whether operatives held to be efficient passed the tests more satisfactorily than their less competent fellow workers. The conclusion arrived at was that the following capacities are of outstanding importance:—

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[1] cf. Second Annual Report of the Industrial Fatigue Research Board (including Analysis of Published Work).

[2] "A Statistical Study of Labour Turnover in Munition and Other Factories." I.F.R.B. General Series No. 4.

(a) Good eyesight and rapidity of visual observation.

(b) Physical strength rather above the average, with right hand and arm dexterity.

(c) General intelligence, and a large immediate memory span.[1]

In order to make this conclusion of practical value in advising young persons whether they are suited for apprenticeship to the printing trade, it would be necessary to subject a large number of boys to tests similar to those employed by the investigator, so as to determine whether the performance of applicants were above or below the average as regards each test. A like procedure would be necessary before vocational tests could be utilised for candidates in any trade. It is also essential that the tests should be applied to apprentices entering a trade, and that they should re-examined annually for, say, ten years, in order to correlate the results with careful records of their industrial success or failure. Moreover, the capacities required for different industrial processes should be standardized and classified in order to facilitate a comparison of trade requirements. Isolated investigations relating to a single process are in themselves of little practical value, and this enquiry may be classed with the numerous similar investigations undertaken in America by Münsterberg, Taylor, and others, as merely a trial trip indicating the possibility of systematic research into the physical and mental capacities needed for all the various processes carried on in industry. But it must be recognised that trade unionists are not likely to regard extensive enquiries of the kind suggested with favour if they are conceived merely as the means of enabling employers to pick the most efficient operatives, and to dictate to workers generally what occupations they should follow. Some assurance would be required that the results would be carefully and sympathetically utilized by Juvenile Labour Advisory Committees in providing the best advice for boys and girls entering industrial life, especially for those who might be discouraged by failure to pass the tests for the occupation or process on which they had set their hearts. The very difference in the combination of mental and physical capacities required for processes in the same trade is a hopeful feature of the study of vocational selection, but it will not attain full fruition unless the importance of finding the right job for the worker is given equal prominence with that of finding the right worker for the job.

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[1] "Three Studies in Vocational Selection." I.F.R.B. No. 16.

The next question for consideration, after that of facilitating choice of the occupation for which the individual is best suited, is how to secure adequate training. At present this important matter is largely left to chance. Instruction may be given to the young learner by a foreman or fellow worker, but there is usually no attempt to insure that the best method shall be taught; further, the methods in use are in most cases traditional and haphazard, no effort having been made to arrive by scientific means at the simplest and best way of accomplishing the work. It is as easy for a beginner to learn a good method as a bad one, whereas it is difficult, if not impossible, for an older worker to exchange a bad for a good method. Trouble should therefore be taken to discover the method which appears on the whole to be the easiest and most economical in movements, and to impart it to a young worker, who should, when fully fledged, be free to modify it, or adopt another method if he prefers it. Moreover, work is facilitated by rhythm, and just as one man finds it more tiring to walk slowly and another fast, one to take short steps and another long, so the rhythm found most helpful varies with the peculiarities of the worker; moreover, some people work better at a steady pace, others in a series of sprints. Two experiments made by investigators are interesting in this connection. Studies were made of two processes in a sweet factory, and it was observed that the girls dipping or covering sweets usually moved their hands in straight lines, such movements involving jerks, and the retracing of ground already covered. In the first case, that of "dipping," the introduction of a continuous circular movement led to an increased output by 27 per cent. among the younger workers, but the older operatives found it impossible to adapt themselves to the new method. Operatives learning the process for the first time by the new method, in a new room, produced an output, after three months, 88 per cent. in excess of workers of the same standing who used the old method in the other room, but a part of this increase may be due to the better conditions in the new room. A circular method was also introduced in "chocolate covering by hand," with the result that learners found the work so easy that in a short time their piece rate earnings equalled those of girls who had worked for several years on the old system.[1] The results of motion study in the processes of "dollying" and "roughing" in the Metal Polishing trade also proved the enormous importance of training learners in good methods.[2]

An interesting report was prepared by a member of the Board who had access to an Iron Foundry where movement study had been introduced during the war, combined with training of workers, improvement in appliances, shorter hours of work and higher wages. The managing director took the view that to fix piece rates by guess-work without adequate data was unsatisfactory both for himself and for his operatives. He therefore explained that the firm was out for higher wages, shorter hours and increased output, and invited his employees to co-operate with him by allowing their movements to be studied. The various jobs were analysed by means of a stop-watch, tools and materials were arranged in such a way as to avoid unproductive movements, a standard set of movements was established, together with a standard time for the performance of each, and such movements as could be combined were performed simultaneously. A card of instructions was then given to the workers during training, hours were reduced from 54 to 48 per week, and a daily rate was fixed at about 25 per cent. above the standard rate for the district. Training—and it must be remembered that in this case it was in many instances re-training of workers already accustomed to other methods—was given individually, because the amount of instruction and supervision required varied too much to admit of group training. A piece price, calculated to yield a fair day's wage, was based on a Standard Output, and the workers were paid piece rates when they were sufficiently trained to earn more than by day-rate. Moreover, when a worker's output reached 60 per cent. of the standard, he received a bonus in the shape of a differential piece-rate by means of which the price paid per piece rose automatically with increased output. It should be noted that the firm pledged itself not to alter piece-rates unless methods of work were changed, and also that any worker would have been permitted to return to the old system had he desired to do so. The effect of the new system was an enormous increase of output; for instance, although the price paid was reduced on one job by 13·3 per cent., the value of output increased five-fold. In the machine shops the output was increased by over 300 per cent., while it was estimated that about 90 per cent. of the increased output in moulding and casting was due to improved efficiency on the " human " side, over 20 per cent. of this being the result of training.[1]

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[1] "Time and Motion Study." I.F.R.B. No. 14.

[2] "Motion Study in Metal Polishing." I.F.R.B. No. 15.

The subject was approached from another side by an " Inquiry into Individual Differences in Output in the Cotton Industry." From this investigation it appeared that individual differences were far greater in processes where the mechanical factor was not predominant, indicating the need for research as to method and movement study in order to secure a higher and more uniform level of production. At present efficiency records are almost non-existent, and the large field for improvement is therefore unrecognized. If scientific training were introduced, it would be possible to estimate the average time required to reach proficiency in various processes, and valuable data would be acquired for determining a proper period of apprenticeship, and for comparing the skill required in different industrial processes.[2]

This brief account should be sufficient to show the wide field offered by time and movement study, and here, again, the Institute of Industrial Psychology is capable of expansion to meet the demand, should employers and workers realise the advantages to be gained from scientific methods both of training and of fixing piece-rates, the effect of hours of labour on fatigue, and the best arrangement of spells of work.

The hours worked in munition factories at the beginning of the war were frequently unduly fatiguing, and failed to yield a maximum output. Under normal conditions when a maximum output should not be required at the expense of the worker, the period of employment should probably be rather shorter than that calculated to yield the greatest output, in order that the strength of the operatives may not be exhausted in a few months or years, and that they may retain a surplus of energy for the enjoyment of leisure. There are also certain cases where the period should be very considerably shorter than that determined by reference to output; for example, the maximum output on a certain light automatic process can be produced in a working week of 70 hours, which is unreasonably long; again, the even distribution of hours over the six working days might theoretically make for maximum output, but the abolition of the customary Saturday half-holiday would indubitably have an untoward psychological effect upon the operatives. There has been a general shortening of hours since the war, and the custom of working before breakfast has been largely discontinued, but much careful and systematic investigation is required before the best arrangement of hours in various industries can be determined, and as suggested in the latter part of this article, the question should be considered in detail by representatives of the different trades concerned.

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[1] "A Study of Improved Methods in an Iron Foundry," I.F.R.B.A No. 3.

[2] " An Analysis of the Individual Differences in the Output of Silk-Weavers." I.F.R.B. No. 17.

An important inquiry, which throws light on the vexed question of overtime, was conducted by the Board into the period required by workers to adapt themselves to shorter hours of labour. It was found that a certain time elapses before the full benefit of reduction to the optimum period manifests itself in cases where excessive hours have been worked, because the operatives have unconsciously protected themselves by slackening their pace and wasting time. The hourly output is apt, in such cases, to increase more rapidly in simple than in complex processes; it is therefore impossible to foretell the time required for adaptation in a particular case. When the hours of tin-plate millmen were reduced from 8 to 6 per shift, the period was about 2 months; when those of open-hearth steel smelters were reduced from 12 to 8, 13 months; again, the period varied from 2 to 4 months in fuse operations, and from 2 to 6 months or more in big shell operations. Where hours are increased, on the contrary, there is little or no adaptation, but a dead drop in hourly output is the immediate result. The inference to be drawn from these observations is that intermittent overtime must be uneconomical, because hourly output will drop immediately upon its introduction, and a certain period will be required for re-adaptation to normal hours.[1]

Another point which emerged in the course of investigation is the effect which the fatigue of one set of operatives may have upon others under their charge. When the men's hours in a shell factory were reduced from 63¼ to 54 per week the women's hourly output in various operations increased 10 per cent. to 42 per cent. although their own hours had been lengthened from 44¼ to 54. This indicated that the tired men had been slack in setting the women's tools and supplying them with material.

In certain kinds of work an unbroken spell of four hours may be too long, and where this is the case one or more pauses for rest and refreshment should be given, a short interval for tea in the afternoon being likely to prove particularly remunerative, but the ideal arrangements will vary with the needs of different industries. An experiment in the metal polishing trade showed that where an organised rest pause of 5 minutes in the hour was introduced, the output was 4 per cent. greater than when the worker paused irregularly at her own option. Another experiment made in the press-room of a stiffener factory in the boot and shoe industry was observed by one of the Board's investigators. Two girls had formerly been employed continuously on the double presses, but the plan was introduced of working them by a team of three girls, each of whom spent twenty minutes every hour occupying herself as she liked in a comfortable rest-room. The experiment lasted for six months, and during that period the output from the six presses increased over 44 per cent. It should be noted that this increased output was secured solely by reorganisation of the work, without any expenditure in new machinery, and that it proved beneficial to the weaker and less skilled workers whose individual output increased.[1]

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[1] "The Speed of Adaptation of Output to Altered Hours of Work." I.F.R.B. No. 6.

In some cases it has been found on investigation that the Saturday output is poor; this is probably due in part at least to causes other than fatigue; it may, for example, be found more difficult to settle down to work for half a day than for a whole one. In an enquiry dealing with the boot and shoe trade, it appeared that the Saturday output, when doubled, was often less than 75 per cent. of that on other days of the week. A five-day working week has been adopted in some factories in the jute trade, but the effect on output has not been recorded. Two days' rest should not be necessary for recuperation if the hours worked during the rest of the week are not excessive, but there are advantages in working harder during five days and enjoying a longer respite, and the matter is eminently one for trade self-determination, if jointly decided by employers and employed.

The health and efficiency of workers are obviously liable to be affected by all conditions of their environment, such as for example, temperature, lighting, noise, dust and vibration. Atmospheric conditions are of great importance, since if these are unsuitable operatives are apt to suffer from nervous depression, lethargy and inefficiency of the muscular system, disturbance of the digestive functions, cardiac overstrain, and vulnerability to infectious disease. The air should be dry, cool, diverse in temperature rather than uniform and monotonous, moving rather than still.

The results of an investigation in tin-plate works showed the beneficial effects of efficient ventilation. The reduction in output during the summer months amounted to 9·2 in factories where there was no artificial ventilation, whereas in works where a good system was installed, the reduction was only 2·9. It was estimated that if factories in this trade now unventilated were efficiently ventilated, the average output throughout the year would increase by 12 per cent. or even more.[1] Another enquiry was carried out during the winter months in silk weaving sheds, and it appeared that within a temperature range of 58°F. to 65°F., output tended to increase with temperature.[2] No ideal temperature can be fixed, as that required for different classes of work varies. The neglect of ventilation has unfortunately accustomed the older operatives to unhealthy conditions, and improvements are therefore fraught with special difficulties. The comfort of the operatives must be considered, and their co-operation secured; a system of ventilation should not, therefore, be installed during the winter, as less discomfort is likely to be caused by increasing ventilation during the summer and continuing it into the autumn.

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[1] "Preliminary Notes on Atmospheric Conditions in Boot and Shoe Factories." I.F.R.B. No. 11.

The lighting of work-places is another condition which materially affects the efficiency and comfort of operatives—no provision of artificial lighting can compensate for lack of daylight, and therefore every effort should be made to prolong natural lighting. There are various devices by which this may be effected, such as due regard to the size of windows in the construction of factories, window-cleaning, which is too often neglected, whitening of external and inside walls and ceilings, and use of reflectors. It was found, in the course of an enquiry in the silk trade, that even where efficient electric lighting was in use the output was 10 per cent. less than during daylight.[3] During the hours when artificial lighting is indispensable, the position and proper shading of lights require careful consideration, in order to prevent eye-strain and consequent headaches.

The Board has not as yet issued a report on the relation of noise to fatigue, but it is possible that even though operatives may apparently become accustomed to working under noisy conditions, the diminution of noise would relieve strain and improve efficiency. Complaints have been made by workers of the ill-effects of vibration, and this matter and also the effect on health of dusty processes, are likely to be made the subjects of special investigations.

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[1] "The Influence of Hours of Work and of Ventilation on Output in Tinplate Manufacture." I.F.R.B. No. 1.

[2] "A Study of Output in Silk-Weaving during the Winter Months." I.F.R.B. No. 9.

[3] "A Study of Output in Silk-Weaving during the Winter Months." I.F.R.B. No. 9.

Efficiency of plant and the provision of labour-saving appliances are of obvious importance in facilitating work and preventing fatigue; for example, unnecessary weight-lifting is often observed, which could be easily obviated at very small expense. The opinion was expressed by an investigator who conducted an enquiry in the Iron and Steel Industry, that if all the iron and steel works in the country adopted the most efficient methods, the average output would probably be increased by something between 50 and 100 per cent.[1] Changes, which might appear trifling in themselves, may be very effective in facilitating work. For instance, it was noticed during the investigation in the confectionery trade already referred to, that the trays used in the dipping process were frequently emptied, and had to be replaced by full trays. The substitution of a larger tray of a convenient size led to substantial decrease in the time spent on unproductive labour.

An important question, which the Board has not yet made the subject of a special investigation, is that of the effect of monotonous work in generating nervous fatigue. The monotony of much industrial work is a common cause of complaint among the spokesmen of labour, but investigators are sometimes surprised to find that workers whom they question, repudiate any dislike to their work on this account, or deny that it is in fact monotonous. It has often been alleged, perhaps invariably by men or female parrots, that women prefer monotonous work and feel themselves unfitted to take responsibility, but the eagerness shown by many women of all classes to undertake interesting and responsible work during the war, makes it necessary to reject the hypothesis of a sex distinction, and the origin of the hypothesis might afford psycho-analysts food for reflection. Monotonous work offers an escape into a life of fantasy, and the temperament able to avail itself of this escape may be commoner among women than among men, but is certainly not confined to them, nor does the possession of this power necessarily denote either a preference for monotonous work, or lack of aptitude for work of another kind. A delightful passage in a letter of Charles Lamb's proves him to have been one of those for whom monotonous work had its charm:—" I could sit and gravely cast up sums in great books, or compare sum with sum, and write ' Paid ' against this, and ' Unpaid ' against t'other, and yet reserve in some corner of my mind ' some darling thoughts all my own '—faint memory of some passage in a book, or the tone of an absent friend's voice—a snatch of Miss Burrell's singing, or a gleam of Fanny Kelly's divine plain face. The two operations might be going on at the same time without thwarting, as the sun's two motions (earth's I mean), or as I sometimes turn round till I am giddy, in my back parlour, while my sister is walking longitudinally in the front; or as the shoulder of veal twists round with the spit, while the smoke wreathes up the chimney." The most taxing work is probably that which offers no variety but requires a constant effort of attention, and where it is not possible to alternate work on such a process with occupation of a different type, the hours of labour should be exceptionally short.

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[1] " Efficiency and Fatigue in the Iron and Steel Industry." I.F.R.B. No. 5.

It will be clear from the foregoing brief account of the Board's work, that it would be too heavy a task for this body, or for a similar body in any other country, to undertake the mass of detailed investigations which would be necessary in order to determine the best possible conditions for all industries. The Board can only pave the way by initiating fruitful lines of enquiry, and by publishing such practical results as may be obtained. Moreover, as has been shown, some of the results are peculiar to the trade concerned, and are immediately productive of increased profits and efficiency; the cost of research could therefore fairly be defrayed by that trade. Further, there are obvious advantages in entrusting investigations of a technical nature to experts in the industry under consideration, rather than to an investigator with general training, who is obliged to waste time in acquiring technical knowledge *ad hoc.* It has, therefore, been suggested that the proper complement of the Board's work would be the formation, in some of the better organized trades, of Joint Research Associations, consisting of representatives of employers and operatives, who should be responsible for their own investigations, and that the expense should be borne by the trade concerned. Where a number of problems are common to a group of trades, it would save both time and money if the Joint Association embraced the whole group. Such bodies would be able to avail themselves of the help and guidance of the Board, and also of the Institute of Industrial Psychology, with which the Board keeps in close touch by the loan of investigators and exchange of results. The notable success of the Board's system of "panel members," explained above, indicates such a line of development, and the existence of Joint Industrial Councils and of Trade Boards, facilitates the establishment of Joint Research Associations. An enquiry, undertaken by two members of the Board, into the present attitude of Trade Unions towards Time and Motion Study, Vocational Selection and kindred matters, indicated that while there is no organized opposition to scientific methods, considerable suspicion and hostility exist. The fear lest the advantage should be mainly or entirely reaped by employers, has unfortunately some basis in past experience, both in this country and in the United States. In some quarters it is alleged that the possession by employers of the capital necessary for research and improvements, ensures their securing an undue share of the benefits, and the lack of a definite Trade Union policy on this question goes far to justify such a fear. Where improved methods have been introduced, the initiative, so far as we are aware, has never come from Trade Unions or from the body of operatives affected. Such methods have been tolerated, if openly used, because the firm was considered to be generous in its treatment of employees in some other respects, or in certain cases the workers have been gradually persuaded to approve the change, because the position has been safeguarded by arrangements agreed upon with the Trade Union. The formation of Joint Research Associations should guarantee swift and sure advance. Joint investigation would enable employers to realize more intimately where the shoe pinches, and would also open their eyes to waste and inconvenience caused by lack of proper organization and of provision of labour-saving appliances. It is not enough for the heads of the firm to be wide-minded and intelligent; it is essential that the same spirit should permeate the minds of managers, foremen and forewomen throughout the works. It is noteworthy in this connection that the Committee on Elimination of Waste in Industry of the Federated American Engineering Societies, reports that over 50 per cent. of the waste discovered is due to management, and less than 25 per cent. to labour.

Three conditions may be cited which, even if they be not expressly secured before a Joint Association starts work, will assuredly be found essential to ultimate practical success.

(a) A definite pledge should be given by the representatives of the manufacturers that any employees thrown out of work by alteration of methods, would be fully compensated. It is probable that with due care and forethought the operatives affected could be re-absorbed at once in most cases in some other department, and the two members of the Board who conducted the inquiry referred to in fact met with no complaints under this head in the examples of improved methods which came under their observation. It is, however, scarcely possible to exaggerate the paralyzing effect of the constant terror of unemployment, an experience which too many individual workers have suffered at some period of their lives. This terror causes hostility to improved methods and labour-saving devices; it saps initiative, because operatives are afraid of suggesting improvements which might lead to their own dismissal, or that of their fellows. The mere assertion of the general economic dictum, that a diminution in the cost of manufacture must increase employment in the long run, will not meet the case; there should be a definite undertaking that the individual shall not suffer, however temporarily, from any changes introduced at the instance of the Joint Association.

(b) An agreement should be made that piece-rates, when once arranged to the satisfaction of both parties, should not be altered while the machinery and methods of production remain the same, and that where such alteration is necessitated, the new arrangement should be mutually satisfactory. The present constant struggle to maintain piece-rates exhausts the energy of Trade Union officials, and excites irritation and hostility among the operatives. Rates are frequently set by guesswork or haphazard methods due to the ignorance of both parties as to the data on which they should be based, whereas if scientific methods were employed in the first instance, there would be no reason for alteration so long as the conditions of production remained the same.

(c) The workers should acquire some measure of interest in and responsibility for the management of the works in which they are employed. It would be beyond the scope of this article to discuss the advisability of any definite form of joint control, or of labour contracts undertaken by Trade Guilds. Test experiments will have to be made in order to determine what is practicable at the present stage in different industries; but such experiments if they are to be successful, must be conducted in an atmosphere of mutual forbearance and goodwill, and should be materially facilitated by the existence of joint research associations. In the meantime the successful conduct of research and experiment is largely dependent upon the co-operation of the workers, and it may safely be predicted that the more difficult and delicate task of putting the results into practice will not be adequately accomplished, unless they are taken into partnership by means of Works Committees or otherwise. However convinced the representatives on such a Research Association might be of the desirability of particular measures, such measures would not be introduced without friction unless the operatives concerned were assured that they did not stand to lose by the change, and that no individuals among them would suffer, and such an assurance is best conveyed by giving them or their representatives a say in the matter. As a preparation for such responsibility, it is desirable that operatives should have some general idea of all the processes carried on in a factory, and should grasp the relation of their own particular job to the whole. Some employers make a practice of taking their employees, or at any rate members of the Works Committee, for a tour round the factory; and in one instance lectures were given by managers and workmen on technical matters affecting the industry. The experiment proved eminently satisfactory in stimulating an intelligent interest and improving the quality of the work; new methods were discussed and experiments instituted, and as the result of improvements introduced together with extra keenness on the part of the workers the output increased about 70 per cent. in one process and about 30 per cent. in another. Research Associations would require the services of investigators skilled in their own trade, with some additional general training, and if the interest of operatives in technical problems peculiar to the industry were more generally stimulated, it may be assumed that men of outstanding ability would come forward as suitable investigators. Moreover, when the time comes for putting into effect the improvements agreed on by a Joint Research Association, it will probably be desirable in many instances to appoint psychological experts in individual factories; and a former foreman or operative may often be the most suitable person to receive the necessary training. In such cases friction would be avoided if a careful explanation were given to the operatives of the nature and objects of the work to be undertaken, and they might fitly be given a voice in the selection of the person to be trained for the position. The Institute of Industrial Psychology would be prepared to train investigators for Research Associations, or industrial psychologists for factory appointments. Problems requiring laboratory research, which would certainly arise in the course of practical investigations, could be referred to the Board for ultimate investigation by one of the Scientific Committees of the Medical Research Council, and assistance on questions relating to the nature of the material used, could be obtained from the Department of Industrial and Scientific Research. In short, the machinery exists for revolutionising industrial conditions, if employers and operatives will grasp the importance of the issue and make use of it.

Although emphasis has been laid on the vast number of data required for anything approaching a complete solution of the problem of Industrial Fatigue, and although it has been argued that the active interest and co-operation of employers and workers are indispensable, the assistance which has been and can be gained from research carried out in other countries, must not be overlooked. The Industrial Fatigue Research Board has received valuable help and advice from Professor Lee, Chairman of the American Committee on Industrial Fatigue, and from many other sources in the United States, and has also been in close touch with the French Comité d'Hygiène; and both the Board and the Institute take measures to acquaint their members with the results of American and continental research.

This article has been mainly concerned in the attempt to show how the further essential information may best be collected and applied, with explicit reference to conditions and institutions existing in Great Britain, but it may be anticipated that it will be eventually possible to carry out a large proportion of the necessary research on an international basis. Such co-operation would prevent the wastefulness of simultaneous work on the same problems, and should also serve to interpret the effect of certain variables where the conditions differed as between one country and another.

# FOREIGN INTELLIGENCE.

## ITALY.

The fourth volume of the "Psychological Contributions of the Laboratory of Experimental Psychology of the University of Rome," which has just been issued, contains works and researches made there from 1918 to 1922 under the direction of Prof. Sante De-Sanctis. This volume comes from one of the most important Italian schools of experimental psychology, and reflects not only the particular line of inquiry of this school, but also the general problems in which Italian psychologists have been mostly interested during recent years. In his paper on "W. Wundt and Experimental Psychology," De-Sanctis defines the sense in which he may be called a Wundtian, and defends the autonomy of psychology against the attacks of the idealistic school, which has now gained a considerable following in Italy. The brief paper by E. Castelli, "The Value of Experimental Psychology and the Idealistic Criticism," deals also with the same subject. Prof. De-Sanctis also devotes two interesting studies in this volume to dream phenomenon, namely, "Oneirological Methods" and "The Physiological Conditions of Dream." In the first he examines all the methods used by him and by other investigators of dreams, indicating various fallacies and the expedients which have been adopted to escape from them. The best plan is one of reciprocal control and consent, and therefore the author, in the study of dreams, has always used all the available methods of modern psychology—that is to say, he relies not only on auto-introspection, but also on hetero-introspection (interrogatory and inquiry), psycho-analysis, external observation of sleeping persons (physiological method), and the multiform experimental method, on which Mourly Vold relied in his recent work. Amongst the results obtained by the experimental method, the author indicates the following:—(1) The dream consciousness will never reproduce immediate acquisitions of the waking consciousness, a certain lapse of time (some hours) is necessary for the elaboration—that is, it is deprived of immediate memory. (2) The volitional powers of waking life do not command the dream at all, whereas, to a certain degree, they do regulate the sleep (awakening at a stated hour). In the second paper the author deals with the physiological conditions of dreams, considering the neglect of vital phenomena in psychological studies to be illegitimate. On these lines he hopes to fill the gap which exists in many recent authors—in particular, in the Freudian school. The author also criticises briefly the various vasomotor theories of sleep (cerebral anæmia: Howel, Mosso; hyperemia: Czerny, Schleich), and makes the following contributions to the theory of organic metabolism:—(1) The diminution of the activity of the nervous centres during sleep must be interpreted as due exclusively to two factors—to the raising of the threshold of sensorial excitement and to immobility; whereas the psychical (cortical) activity is in no way annulled. (2) A part of the modifications of metabolism during sleep is due specifically to the dream activity (dream fatigue). Examining the toxic and chemical theories of sleep (Piéron, Legendre, Pighini, Barbara), the author considers as proved the theory of Piéron and Legendre concerning the existence of a toxic substance, "hypnotoxine," but he reserves judgment about the localisation of the hypnotoxic action. He refutes the histological theory as a fantastic hypothesis, but, on the contrary, he considers as incontestable the biological conception of sleep (Burdach, Foster, Brunelli, Polimanti, Claparède), which considers it as a case of the great law of periodicity and rhythm which regulates all cosmic and vital phenomena. Studying the intensity of sleep, the author arrives at the conclusion that only the first phase of the curve constitutes true sleep produced *by biological need*; the other phases are *luxury sleep*, and in this he finds the explanation of the fact that sleep is partly dominated by the will. He then examines the relation between dreams and the depth of sleep and position of sleeping person, and endeavours to express the phenomenon of dream in cerebral terms. This paper will form a chapter of a book shortly to be published in Germany: *Psychologie des Traumes* (München, Reinhardt).

In another interesting paper, "The Psychology of Vocation," De-Sanctis criticises various currents of vocational psychology, and communicates the results obtained under his direction in his laboratory and in the schools. A determined vocation results from a right proportion between the psycho-physiological capital of natural inclinations, the acquired functional dispositions of the individual, and the demands of labour. Vocation may be considered as a psycho-physiological state which is formed according to certain organic and psychical structures and the faculties or inhibitions of individuals. But the author does not doubt that a sound and normal man ought to be considered—virtually—as a labourer with complete aptitudes. While examining the methods for ascertaining the aptitudes, he criticises severely the psycho-physiological line of inquiry of the American psychologists (the so-called "Psychotechnique"), who have a tendency towards mere professionalism. He then expounds the practical applications made in this field in Italy—in particular, by the pupils of Mosso, Treves, and Patrizi—and those made in his laboratory and in the "Villa Amalia" with deficient and normal children and with the mutilated in war.

In the paper, "Labour and the Abnormals," De-Sanctis deals with a very controversial argument about the application of labour in schools for abnormals. He maintains that there is a relation between feeble-mindedness and delinquency, but he finds that the remedy is rather in the hands of the educator than in those of the psychiatrist or hygienist. He criticises severely the doctrines of Taylor, and considers the abuse by American psychologists of "reactives" for the feeble-minded to be very exaggerated. He inclines towards individual investigation of abnormals, and insists on the individual school, consenting to apply Taylorism only with those in whom every creative capacity is wanting. He also gives a detailed project of a school of four degrees.

The paper by R. Saladini, "The Arithmetical Pupil," is a methodological contribution to the differential psychology of children with particular aptitude for arithmetic. In the brief essay, "Problems and Programmes of the Positive School," De-Sanctis, as one of the representatives of the Italian school of penal law, endeavours to resolve the problem of *free will* by making a distinction between it and the problem of *will* alone, and concluding that voluntariness signifies capacity of having normal volitions, while juridically it signifies capacity for regulating the behaviour according to legal ideal and the type of contemporary society. He affirms that in absolute delinquents there is an incapacity of willing, and that in their crime this incapacity reveals itself as an exponent of a defective personality. The psycho-criminologist must inquire into the psychological determinants of the crime The same conception of determinism is expounded by De-Sanctis in a long and interesting paper, "Psychiatry and Criminology." In order to solve the equation, abnormality-delinquency, the author investigates its foundation in fact and examines all the modern theories—French, English, and American—criticising the latter severely for their exaggerated faith in statistics and tests and for their deficient and confused nomenclature. The result of these researches leads him to distinguish between two categories of delinquents, namely, *true* and *false*. The first category consists mostly of individuals with obvious organic determinants; in the second are found chiefly neuropsychopaths and the feeble-minded. The criminal class, therefore, is not composed of madmen in a state of unconsciousness and necessity, but by abnormal persons of full but feeble psychical autonomy.

Prof. A. Gemelli, Director of the Psychological Laboratory of the Catholic University in Milan, has kindly informed us that the principal researches which are actually in progress under his direction are: Analysis of voluntary activity; experimental study on prayer; researches on retrograde associations; experimental studies on sentiments and intelligence.

### PERIODICALS.

*Rivista di Filosofia Neo-scolastica* (No. 3-4, 1922). A. Gemelli: "Consciousness according to the Most Recent Researches of Experimental Psychology." In this most interesting and noteworthy paper the author aims at fixing the conception of consciousness; he bases his views exclusively on the positive data of experiment and observation, whereas usually in the discussion of fundamental psychological conceptions that intrusion of philosophical ideas is noticeable which has been always so pernicious to its progress. He follows in this the example of the great Italian psychologist, F. Bonatelli, who admirably achieved the same task in his book, *Consciousness and the Interior Mechanism* (1872). A study of consciousness based on psychological data has the merit of determining positively its fundamental properties, and of demonstrating the legitimacy and utility of the conception of psychology as an autonomous science. But the author does not mean that psychology ought to be considered as a natural science; on the contrary, in view of its subject matter, its conclusions have a peculiar philosophical importance. He examines and criticises with great subtlety certain modern researches on the "narrowness" of consciousness, and relying especially on the observations of Külpe and on the recent experimental researches of Mager, he concludes that consciousness must be considered from two points of view—from that of its content and that of its activity. In the first case it appears as the sum of actual psychical elements; but, as activity, it can manifest itself at every moment only in one psychical act; we cannot, for instance, make two judgments or two volitions simultaneously. This fact has a singular importance, because it indicates the reason for the narrowness of consciousness—it is determined by attention. Modern psychology has emphasised the importance of the synthetic function of the activity of the Ego, for consciousness has no " field " to be considered in a mechanical sense as capable of being narrowed and widened in accordance with the objects included in it, it is a voluntary activity which eliminates useless elements and preserves and assimilates the useful ones. Moreover, the importance which the unconscious has for our psychic life proves the impossibility of identifying consciousness with the latter, and serves, therefore, to confute the idealistic doctrine. Consciousness is a unification of all the activities of the Ego in a synthetic unity—an organic and conscious synthesis. Such a synthetic conception of consciousness results from analysis of facts collected by experimental psychology. Thus the author could construct a doctrine of consciousness without appealing to any philosophical doctrine. But this construction has a philosophical importance, because the experimental demonstration of the synthetic unity of consciousness leads necessarily to admitting the existence of the Soul. Moreover, the conception of consciousness as a function and as a synthetic autonomous activity (based on experimental data) confutes among others the associationist and evolutionist psychological doctrines. These results show the philosophical importance of psychological research, and of the analysis of consciousness in particular.

*Rivista di Psicologia* (No. 2-3, 1922). E. Pietrosi: " Educative Efficacy of Pain." This question has been recently much discussed in Italy by the followers of the idealistic school, who answer it in the negative. The author, on the contrary, vigorously attacks the idealistic arguments, and maintains that pain is a means by which the Spirit reveals to us its opposition to nature and gives us the consciousness of its irreducibility and autonomy—that is, it appears as the first cause of a manifestation of moral consciousness. It is natural, therefore, that education may find in pain an efficacious help. Pain in all its various manifestations has the task of refining the human spirit. G. Vidoni: " Notes on the ' Metric Scale ' of Binet and Simon and on the ' Summary Psychological Examination ' of Francia and Ferrari." The author contrasts the well-known method of the " metric scale of intelligence " with the less known one of Francia and Ferrari, and bases his judgment on observations nad inquiries made in a Genoese school for the deficient. In some experiments he found a perfect concord between both methods. He observes that the concept of " mental age " ought to be adopted with great caution, in particular with regard to the graver forms of neurasthenia. G. Corberi and E. Torriani: " An Examination of Memory in Normal Children." This interesting paper contains the results of experimental researches performed by the well-known method of Claparède, with certain important modifications, in order to study the capacity of recall, besides that of fixation.

### FRANCE.

In the *Journal de Psychologie* for 1922 the following papers were notable:—A. Van Gennep: " Religion and Nationality." These are not always parallel phenomena: the Jews, for example, included several nationalities; Christ, Mohammed, Buddha were not nationalists. But there is between religion and nationality a relationship which is shown up by the events of history, and such that it is impossible to make out which is the cause and which the effect. Sometimes they are opposed; sometimes they agree: for example, in spite of its theoretical universalism, Christianity has strengthened the nationalistic feeling in territories bordering on Islamic countries; sometimes the fact, for different and neighbouring nationalities, of belonging to the same religion, has been used with an aim towards imperialist domination; sometimes the fact of belonging to a different religion or to a schismatic offspring of the same religion has been used by oppressed nationalities as a means of freeing themselves from the domination of another nationality: with the Reformation began the movement of nationalities, but the nationalistic feeling is one of the deep causes of the Reformation. Sometimes, on the contrary, religion makes use of nationalistic feeling for its own aims: in order to penetrate better into the intimacy of the national group, it speaks in the vernacular. But at present a growing independence of nationalism towards religion is observable. L. Lapicque: "Le poids du cerveau et l'intelligence." In this article, in which M. Lapicque relates the various methods that were successively tried in order to calculate the relation between intelligence and the weight of the brain in the various animal species, we encounter an interesting practical problem: the average weight of the encephalon is less in woman than in man. Does it prove the intellectual inferiority of women? No: there are individual differences: the weights of the female brains vary from 1000 gr. to 1500 gr., and the weights of the male brains from 1150 to 1700. So that on a large part of the scale of variations are to be found both men and women. For the human species, the difference in the encephalic weight does not constitute by itself a secondary sexual difference; there is only a difference in bodily size, which reacts on the nervous system. Granet: "Le langage de la douleur d'après les rites funéraires de la chine classique." The stupor that follows a great loss is not exclusively, as is commonly believed, a physiological or psychological reflex: the influence of society upon the expression of our emotions must not be forgotten. The sociological study of the mourning manifestations in Ancient China shows that this stupor is measured, controlled, and demanded by the public. There are rules which prescribe in each case the duration of the mourning, the quantity of pain and of proper manifestations, which vary according to the degree of relationship of the survivors and the social position of the deceased. The mourning family gets help in as much as it expresses its pains with the proper signs, the only ones which, being immediately understood, arouse at once the sympathy of society. Society, which has a superior interest in retrieving the broken equilibrium of the family disorganised by the death of one of its members, takes care that the survivors are faithful to the traditional symbolism. This mourning symbolism was afterwards extended to all sorts of circumstances. A language was thus constituted, the grammarians of which are the ritualists. In primitive societies, and, more generally speaking, in all societies where the individual has no value by himself, the expression of the sentiments is obligatory and fixed by definite rules:

for in such societies, the society and the individuals are too closely connected for the former to take no interest in the emotions of the latter, and not to regulate their expression. This expression becomes spontaneous only when society is unstable enough for the individual to perceive a dissociation between his ideal and the social organisation. Masson-Oursel: "De l'utilisation de la mèthode comparative comme critère de la positivité des faits psychologiques." The greatest difficulty in psychology is to overtake the "datum." Our psychology is relative to our own tradition, made of Jewish and Christian religious ideas and of Greek philosophical doctrines. But there are other psychologies than our own: *e.g.*, the static conception of psychology of the classical rationalism is radically opposed to the Indian dynamism. On another hand, there is harmony between the European Mysticism and the Indian Mysticism. These instances show that, in order to make of psychology a really objective science, we must use the comparative method—*i.e.*, we must compare the results of our psychology with those of the psychology of the great civilisations, such as that of China or of India. We can thus arrive at a positive foundation of the psychological "datum." M. Déat: "Reflexions sur la Paramnèsie." The author agrees with the Bergsonian interpretation of the phenomenon: what characterises paramnesia is that the subject becomes at the same time both spectator and actor; that he feels that what is happening cannot be avoided; that the recollection cannot be situated in any definite past; that the subject is sure that it is a thorough recommencement, but is conscious that this feeling is an illusion; that the phenomenon ends as suddenly as it began. But for M. Déat, Bergson's theory is imperfect, because, according to the above description, the phenomenon happens on only one level of consciousness, while for him, the chief characteristic of paramnesia being the splitting of the personality, this dissociation of the consciousness works itself out from one level to another lower one, and this passage from one level to another is effected by means of a symbolic transfer. There is paramnesia whenever there is a symbolic transfer, a sympathetic vibration between a superficial—imaginative or rational—level of consciousness, *e.g.*, a philosophical reasoning, and a deeper level, *e.g.*, an organic rhythm analogous to the rhythm of our reasoning, as the beating of our heart. There is, then, an opposition between our rational conviction of the newness of our reasoning and the affective conviction of the familiarity of the organic phenomenon. Such is, according to M. Déat, the mechanism of paramnesia. It can also explain paresthesia, or feeling of the "never seen," but here the mechanism is opposite: the rational conviction is that of the "already seen," and the affective conviction that of the "never seen." This phenomenon frequently appears on recovering from an illness, when the consciousness has to face with deep organic changes. F. Sartiaux: "Genèse de la Mètaphysique." Metaphysics has arisen in the religions of salvation, *i.e.*, in the only religions which gave rise to theologies, the Naturalist religions having produced only myths. At the bottom of all metaphysics one can find again the chief theme of the religions of salvation: the distinction between an inferior and a superior reality, and their chief care—to raise man from the lower reality up to the higher reality. *Metaphysics is the prolongation of theology*; like theology, it is an attempt to escape from reality. When the religious beliefs are no longer strong enough to continue without reflection, but are not yet weak enough to disappear, men feel that it is necessary to modify certain contradictory elements and to keep those which they regard as indispensable. Metaphysical thought is therefore an adaptation of the mind to certain traditional beliefs; meanwhile, knowledge is an adaptation of the mind to facts. Metaphysics is to theology what the latter is to myths and rites: it explains, purifies, rationalises theology, just as theology explains, purifies, and rationalises myths.

### UNITED STATES.

The third meeting of the Boston Group of Psychologists was held at Clark University on November 4th, 1922. The group included teachers and experimentalists of twelve institutions within a radius of 100 miles from Boston. Among those present were Pres. Emeritus Stanley Hall, Dr. Morton Prince, Prof. Wm. McDougall, and Prof. Sanford, formerly president of Clark College, who opened the meeting.

The following topics were warmly and profitably discussed:—

1. The "professional" *v.* the "personal" point of view in training for the doctor's degree in Psychology.
2. The most helpful sort of work for Psychology at the present time: Is it getting more facts or more theoretical systematization, more text books or more monographs, more definitions, more applications, or more opening up of new fields of research?
3. What rôle, if any, has "meaning" in Psychology?
4. The most pressing difficulties now met with in the teaching of Psychology.

Dr. Stanley Hall entertained the members of the group at his home after the meeting.

The meeting of the American Psychological Association is to take place in Boston toward the end of December, when the American Association for the Advancement of Science is to hold its meetings in the same vicinity. There will thus be a joint session this year between the A.P.A. and Section I. of the A.A.A.S. The programme includes sessions in general psychology, applied psychology, experimental psychology, mental measurements, comparative psychology, and clinical psychology.

Though fully a score of psychological periodicals are being published in the United States, the plan is being seriously discussed of adding an abstract journal or making two distinct periodicals out of the *Psychological Bulletin*, one for the publication of special and general reviews, another for abstracts. A Questionnaire regarding this matter has been sent to all the members of the American Psychological Association.

The *Psychological Bulletin* has been able to acquaint its readers with the work of German psychologists by printing reviews and abstracts by German writers. Most of these appear in the *Bulletin* in German.

Several new text books, as well as revised editions of old text books, have been brought out within the last few months. Warren's *Elements of Human Psychology* is an abridgement of his previous text book, while Dunlap's *Elements of Scientific Psychology* is an expansion of his more elementary *System of Psychology*. Givler's *Psychology: The Science of Human Behavior* is a popular presentation of the subject from a behavioristic angle. Pillsbury's *Fundamentals of Psychology* in its revised form treats the science rather fully along traditional lines. McDougall's new text book, *An Outline of Psychology*, is to appear very shortly.

There is a greater interest taken at present in the theoretical orientation of psychology. J. S. Moore has made a good beginning with his *Foundations of Psychology*. In its wake followed Robert MacDougall's *Problems of Psychology*, C. C. Josey's *The Social Philosophy of Instinct*, and A. A. Roback's *Behaviorism and Psychology*.

Recent American publications primarily of interest to psychologists, though not of a technical nature, are H. L. Hollingworth's *Judging Human Character* and Miss M. Münsterberg's *Hugo Münsterberg*.

Dr. H. Goddard, who was formerly director of the Ohio State Bureau of Juvenile Research, has become professor of abnormal psychology at Ohio State University. Dr. E. C. Sanford, professor of psychology at Clark University, is acting as head of the Institution in the absence of Pres. Atwood, who has left for abroad.

The Psychological Laboratories in the American Universities are, so far as the writer has been able to gather, more active this year than ever. Several of the larger universities, including Harvard, University of Michigan, and Iowa State University, have each published within the last few months a collection of their investigations.

Our subsequent reports will contain lists of experimental problems, other than those already mentioned in this Journal, studied in the various American psychological laboratories.

# SURVEY OF CURRENT LITERATURE

**Economic Motives.** A Study in the Psychological Foundations of Economic Theory. By Z. C. Dickinson. (Harvard Economic Studies; Oxford University Press, 12/6.)

It is surprising that we have had to wait so long for a book such as Professor Dickinson, of the University of Minnesota, here offers us. There are many points in which economics as at present conceived enters the psychological field, not only in all that relates to "motive" and "value," "want" and "utility," but over a wide range of problems concerned with fatigue, efficiency, scientific management, birth-control, and so forth. The older writers, as Professor Dickinson shews in detail in the first part of his work, were far more directly concerned with psychological assumptions than is generally admitted; and after a survey of the Associationist-Hedonist position, he passes, in Part II, to a discussion of the psychology of Motives.

The point of view adopted is roughly that of Behaviourism interpreted in the broad biological sense; and in the third and concluding portion of the work it is laid down that the Hedonist position is broadly true. Over so large a number of observations variations due to minor forces offset one another. But theoretical and deductive reasoning of a psychological nature must be carefully checked by statistical methods, and here the procedure of economics is ultimately that of psychology itself:—

> "This dependence upon the statistical tool is nowhere more marked than in contemporary psychology; and consequently the economist will get more enlightenment upon most points of economic psychology from his own behaviour-statistics than from anything in the doctrines of psychologists, who have not yet gotten around to the special problems with which the economist is concerned. Statistical curves and deviation-measures of learning, of 'intelligence quotients,' of conditioned reflexes, and of many other phenomena are being collected and analysed in the laboratory; but if we inquire into particulars concerning the motivation relations of saving and the interest rate, or of work and wages, the psychologist can give us only a general reply which needs exhaustive elaboration from economic experience tables."

Professor Dickinson rightly points out that critics of the mathematical work of Marshall and Pigou have too often supposed that the use of the method of infinitesimal increments is based on an assumption that the individual man does in fact make indefinitely small calculations; whereas the inertia of large groups of mortal behaviour-facts which is really at the basis of the most fruitful mathematical work is on the whole a valid hypothesis. And as an example of the catholicity of his outlook we may note the attention paid to such writers as Veblen, and the pages, 183-188, devoted to a discussion of theories of the subconscious. The criticism of the Freudians is clear and terse, and is to the effect that their neglect of the minute neural mechanisms of the mind will result in many of their sweeping generalizations being overthrown. It is doubtful whether their formulas of the everlasting life of wishes, and of the behaviour of wishes under suppression, will hold of all human motives; these are probably over-hasty generalizations from the phenomena of hunger and sex, which, as we have seen, have physiological cycles that are peculiar to themselves. The other fundamental groups of instincts, such as rage, fear, striving for social approval, may indeed be capable of permanent suppression, because the external stimuli exciting them cannot be totally abolished, but that is a different matter from a gnawing canker of discontent pent up within the subject himself. So far as the stimuli to rage and fear can be removed, apparently these instincts can be harmlessly suppressed; and so far as the stimuli to emulation or self-assertion or parental behaviour can be manipulated by social control, the behaviour arising from these instincts can be controlled. On the other hand, it is admitted that Freud's treatment of the determining tendencies reinforces the associationist view, and is therefore part of the body of psychological opinion with which economics, regarded as a statistical analysis of behaviour-data, is ultimately concerned.

**The Psychology of the Criminal.** By M. HAMBLIN SMITH, M.D. (Methuen, 6/- net.)

**The Psychology of Misconduct, Vice, and Crime.** By BERNARD HOLLANDER, M.D. (Allen and Unwin, 7/6.)

**Penal Discipline.** By MARY GORDON, L.R.C.P. (Kegan Paul, 7/6.)

Dr. Hamblin Smith is Medical Officer at Birmingham Prison, and a Lecturer on Criminology at the University; and were all prison doctors as well informed on the findings of modern psychology as he here shews himself, the reform of our penal system could not long be delayed. He has compressed into a single volume the experience of 23 years, though perhaps his interest in psychology is a recent development; and, like all reformers in this field, he is much indebted to Healey's great work, *The Individual Delinquent.*

His practical proposals are worth special attention. He discusses, for instance, the suggestion that there should be a travelling mental expert in each district. This plan is now being tried in the State of Illinois. It has certain advantages, but, as he points out, the examiner would have to waste much time in travelling. And the examination might have to be made in unsuitable surroundings, and at a time when neither subject nor examiner was in the best mood.

Mental examinations must, of course, be made *before* trial and sentence, and not, as is usual now, after; and for the training of experts it is recommended that in every university town there should be a centre of "criminological" research and teaching at which young medical graduates might learn their work. Of this work the mental examiner for the district should be the head, the director, and, above all, the inspirer (p. 169). Formal lectures should be given to classes, while practical demonstrations would best be conducted informally and individually. He urges that there is an immense amount of valuable work waiting to be done in this way. And such a scheme as is here outlined would give a great impetus to interest in this vital subject, as well as to the preparation of future examiners.

Finally, it is worth noting that though the name of the King is generally known by criminals, the name of the Prime Minister is "so seldom known that the author has almost given up asking it."

Though much of what he writes is useful and suggestive, the level at which Dr. Hollander's discussion is conducted may be gathered from two extracts:—

"One of the chief causes of misconduct is lack of proper education. This may sound incredible, considering that the cases which come before the mental specialist belong nearly all to the wealthier classes of society. I had better explain, therefore, what I mean by lack of education. Of course, all children are trained to read, write, and calculate. . . ." etc. (p. 37).

"The undoing of criminals by women offsets to a certain extent their occasional malign influence. Once the woman in whom the criminal is interested is located, his capture is almost a foregone conclusion. Sooner or later he will be found in her society" (p. 131).

And whereas he remarks that prostitutes do not come within the observation of the "psychological physician," a large part of Dr. Gordon's interesting observations are concerned with this section of the community. Particularly informative are her chapters on the practice of tattooing women, which has become more and more popular during the present century. Some illustrations of tattoo patterns are given, and it is urged that the practice could and should be put down by law. For the rest, the author, an experienced Inspector of Prisons, regards our Prison System as "a social curiosity," and considers that it is time delinquents were scientifically treated—by doctors and psychologists.

**The Supremacy of Spirit.** By C. A. RICHARDSON. (Kegan Paul, 5/-.)

**Desire and Reason.** By K. J. SPALDING. (Kegan Paul, 8/6.)

These two works will appeal to all who are in sympathy with the romanticist tendency which has asserted itself so markedly on the Continent, and to a lesser extent in England, since the war. The first, by a follower of the well-known Cambridge idealist, Professor James Ward, states in clear and simple language the case for "the spiritual nature of reality," and contends that although mental activity is perhaps always accompanied during the incarnate life by bodily activity, and although the latter is one important condition of the full development of the former, yet mental activity may quite well continue after bodily death. Whether our existence in the next world is truly discarnate, or whether we still possess some kind of body, though a different problem, is, thinks Mr. Richardson, one which we have not yet sufficient knowledge at our disposal to settle. The second, by Professor Spalding, of Queen's College, is an account of Philosophy as "the attempt to discover in things a *necessary* existence: and by this I mean one required by the *mind*."

Mr. Richardson's work is frankly addressed to the general reader, and it may be commended for an interesting attempt to interpret the phenomena of "psychical research," too often neglected, both by idealists and their opponents. He rightly insists that "the promise of illuminating the hidden secrets of the universe which the phenomena hold forth is well worth any trouble that may be expended in elucidating them," though whether the body will, as he believes, "be seen to be constituted by a community of spirits similar in essence, though differing in degree of development from the mind or dominant spirit to whom the body belonged," may seem to many a more doubtful contention.

Professor Spalding's method is reminiscent of Boehme. He is concerned primarily to show that "the soul *desires* the Spirit, that the Spirit exists; and that she is an object of knowledge" (p. 205). And in this he is convinced that he has succeeded. He comes to us as a liberator. When Spirits are free and in their right minds, they will have finally shaken off that spell which still deludes animal souls with strange loves. In the first place, they will be disinterested, losing remembrance of "themselves" and ceasing to lust after the riches of this world:—

> "The soul which has attained this state will, in the second place, perceive the truth of Being itself. The eye of her Desire will be opened, and she will now see things as they are. For when, having closed her eyes on herself, she has opened them on the universe, at the time that she herself disappears, all other things will appear to her, they will seem to become large and lofty, and to be possessed of a significance not hitherto dreamed of: gazing before her, the soul will contemplate with delight the universal Reason of Being. The nature of this transformation is not easily intelligible; but it may be supposed that if any creatures were to have its eyes thus opened it would have realized that end which it exists to attain."

Psychologists have often upbraided cosmologists with a tendency to build systems in accordance with their desires; but here is one who calls himself a philosopher asserting that only that is real which is in conformity with desire. "We have assumed the *desire* of the soul; and have thence, so far as we could, deduced or interpreted all our *experience*." And why so? Because "Truth is the only refuge of the soul." Criticism is thus completely disarmed.

**Opiate Addiction.** By E. H. Williams. (Macmillan and Co., 1922, 10/-.)

With the gradual relaxation of moral restraint through large sections of the community, the subject of drugs is likely to become one of increasing social importance. Opium, as Dr. Williams points out, is our most useful and most important drug. To curtail its legitimate use would be to cause untold suffering among countless innocent persons afflicted with painful diseases. On the other hand, the problem of curative treatment has as yet hardly been approached, and the author, who is a Lecturer on Criminology and Mental Hygiene in the University of California, has written a clear and informative book. Readers familiar with such literature as Aleister Crowley's *Diary of a Drug Fiend* will look in vain for startling psychological material; and the utmost that Dr. Williams here claims is that it should be possible "to treat certain cases so that the individual will not take any opiate, and will be free from any desire to do so," but the patient remains with "a greater susceptibility to the acquirement of addiction." His remarks on the subject of inexperienced treatment (p. 110) are particularly valuable, for the opiate addict is the most sophisticated of all patients; and, being unusually critical, he is quick to detect any weakness and to become difficult of management.

## PERIODICALS.

*The Psychological Bulletin* (June, 1922). E. A. M. Gamble contributes a valuable examination of Henning's theory of smell, since the publication of which, in 1915, "the psychology of taste and smell has altered almost as much as the map of Europe has changed in the same period." The "smell prism" and the "taste tetrahedron," which Henning would add to the colour pyramid, are here conveniently analysed.

*The Journal of Comparative Psychology* (June, 1922). S. J. Holmes on the classification of forms of Animal Behaviour. J. R. Kantor on the integrative character of Habits. Otto Ortmann, of the Peabody Conservatory of Music, has a noteworthy contribution on "The Sensorial Basis of Music Appreciation." He contends that an important part of the enjoyment of music, as presented to-day, is non-auditory in character; and that, for example, the so-called "characteristics of keys" result from the operation of tertiary attributes, involving by association the entire sensorial complex of the field of sensation. On this view there is but one primary attribute of auditory sensation, *extensity* in its three forms—transtensity (pitch), intensity (loudness), and protensity (duration). "Quality" is the sensorial complex resulting from the simultaneous presence in consciousness of the three primary attributes, and may be called "sensation-form." It will vary with a change in any one of the three attributes, pitch, loudness, and duration. Tone-forms in the art of music being seldom simple, the feeling-tone associated with any given musical sound will be relatively rich. And if we admit with Ortmann that tertiary attributes are those "read into tonal sensation through the action of sensations, present or past, of other sensory fields," it would seem to follow that (since the entire problem of individual differences in musical appreciation is intimately connected with tertiary attributes) individuals will vary so greatly in their judgments that any general agreement in æsthetics would be most improbable.

*The Psychoanalytic Review* (October, 1922). L. Pierce Clark on "The Epileptic Personality in the Genius." Arthur L. Keith collects evidence to show that Vergil was a "master of psychology."

*The Journal of Abnormal Psychology* (April-June, 1922). "Imitation and Mental Adjustment," by J. Petersen; "The Etiology of Phobias," by E. Bagby. Articles on "Deficient Children," by J. E. W. Wallin, Leta S. Hollingworth, and E. R. Weybridge. "Social Psychology" is discussed by J. R. Kantor and Zora Schapp; while A. A. Roback deals with "Behaviourism in the Light of Medicine."

*Mind* (October, 1922), in addition to a Symposium on the Unconscious, contains an important discussion on Physics and Perception by Mr. Russell and Professor Strong, and a Review of Mr. Johnson's "Logic," Part II, by Professor C. D. Broad.

*The Journal of Educational Psychology* (September, 1922). E. L. Thorndike and C. B. Upton describe an experiment in the learning of an abstract subject by an adult which may be compared with the learning of algebra by a child. The October number is chiefly concerned with intelligence tests.

*The Monist* (October, 1922). Philosophical articles by L. A. Reid, H. E. Cunningham, and others. Professor Benjamin Smith discusses the theories of Spengler, though the Editor and printers seem to be unaware how to spell that author's name.

*Theosophy* (October, 1922) is chiefly devoted to the President of the Society, Mrs. Besant, with a photograph.